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DEFINING A PLASTICS DIVERSION STRATEGY - A REPORT BY THE ONTARIO PLASTICS STRATEGY TEAM

APRIL 1994

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ABSTRACT

The Ontario Plastics Strategy Team was formed in June, 1992, at the invitation of the Waste Reduction Office of the Ontario Ministry of Environment and Energy. The membership of this multi-stakeholder group comprises representatives from the plastics industry (including resin producers, convertors, brand owners, retailers and recycling companies), industry associations, municipalities, government agencies, labour and public interest groups. Its mandate is to identify barriers that inhibit the diversion of plastics from disposal, and to propose and initiate solutions aimed at minimizing the waste of plastic resources. The team is to address the diversion of plastics from the wastes generated by both the residential sector and the industrial, commercial and institutional sectors.

"Defining a Plastics Diversion Strategy," outlines the mandate and structure of the Plastics Strategy Team, identifies the barriers to greater diversion, and describes a series of proposed Action Plans that would address these barriers, develop techniques to overcome them, and maximize diversion. The strategic implementation of these Action Plans, as well as the role the Plastics Strategy Team may play in their implementation, is discussed.

Appendices to the report contain a list of common acronyms, the full texts of the Action Plans, a glossary of technical terms, the original Terms of Reference, a list of participating stakeholders, and background information on the production, use and disposal of plastics in Ontario. Waste diversion activities practiced by the plastics industry, municipalities and government agencies are highlighted.

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"Defining a Plastics Diversion Strategy" was assembled by a writing team representing multi-stakeholder membership of the Ontario Plastics Strategy Team. The views and ideas expressed do not necessarily reflect those of the individual members of the Strategy Team or the Ministry of Environment and Energy. In addition, mention of trade names or commercial products does not constitute an endorsement or recommendation of their use. The members of the writing team were:

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LIST OF PROPOSED ACTION PLANS

Background Information

1. Compile 3Rs Design Guidelines for Packaging
2. Compile Catalogue of Plastics Environmental Information
3. Implement Municipal Processing Cost Model
4. Communicate 3Rs Design Guidelines for Durables
5. Identify Issues, Barriers and Needs of Brand Owners
6. Characterize Plastic Materials Used for the Production of Durables
7. Evaluate Available Technologies for Tertiary Recycling

Diversion Initiatives

8. Select Key IC&I Resins for Immediate Diversion
9. Implement Plan for Diverting Key IC&I Resins
10. Develop Plan for Diverting Residential Non-durables
11. Develop Plan for Diverting Residential Durables
12. Gather and Diseminate 3Rs Design Standards for Durable Products

Market Development

13. Develop Immediate Marketing Initiatives for PCR
14. Develop Long-Term Marketing Initiatives for PCR
15. Develop a Procurement Strategy for PCR
16. Define Market Development Needs (Residential)
17. Evaluate Use of PCR in Non-Durables

Education & Communications

18. Compile 2Rs Case Studies
19. Enhance School Curriculum
20. Develop and Implement Training Programs
21. Develop an Integrated 3Rs Communications Strategy
22. Develop 3Rs Fact Sheets
23. Disseminate Life Cycle Analysis Information

Tracking & Monitoring

24. Provide Quarterly Advice to MOEE on Plastics Designation in the Ontario 3Rs Regulation
25. Develop a Mechanism to Track Impact of 3Rs Strategy
26. Develop a Mechanism to Track Plastics Use/Disposal
27. Evaluate Development of Residential Collection Programs

Regulatory & Nonregulatory Policies

28. Compile Inventory of Regulatory and Policy Issues
29. Evaluate Effectiveness of Voluntary/Mandatory Policy Tools
30. Evaluate Effectiveness of Labelling, Advertising and Coding
31. Evaluate Policy Instruments Needed to Divert IC&I Plastics Packaging

EXECUTIVE SUMMARY

"Defining a Plastics Diversion Strategy" is a report of the Plastics Strategy Team, a multi-stakeholder group comprising representatives from the plastics industry, municipalities, government agencies, labour and public interest groups. The purpose of this report is to identify barriers that inhibit the diversion of plastics from disposal, and to propose and initiate solutions aimed at overcoming such barriers and minimizing the waste of plastic resources. The report is considered to be a stepping stone from the development to the implementation of cooperative plans that will further divert plastics from the Ontario waste stream.

The reduction of wastes at source is a priority for all stakeholders. There has been a tremendous amount of work done to date in this area. The plastics industry has already diverted significant amounts of plastic from disposal through initiatives such as light-weighting and redesigning containers, developing reuseable and/or refillable packaging systems, and switching to more durable plastic products. The report highlights some of the current waste diversion activities of the plastics industry, municipalities and provincial agencies. However, there are additional opportunities to cut waste through the 3Rs and much work remains to be done. The identification of these opportunities and the design of practical programs for realizing them are the primary focus of this report.

The Plastics Strategy Team was assembled at the invitation of the Waste Reduction Office of the Ontario Ministry of Environment and Energy to offer its expert advice on the diversion of plastics from disposal and ensure that the affected stakeholders have an opportunity to contribute to Ontario's long-term waste management policies.

To date, the team has identified such barriers and created a series of 31 Action Plans which, collectively, are aimed at maximizing the diversion of plastics from disposal.

"Defining a Plastics Diversion Strategy" outlines the mandate and structure of the Plastics Strategy Team, identifies the barriers to greater diversion, and contains the full text of the series of 31 proposed Action Plans that would address these barriers, develop techniques to overcome them, and maximize diversion. The strategic implementation of these Action Plans, as well as the role the Plastics Strategy Team may play in their implementation, is discussed.

However, all stakeholders, both private and public sector, are experiencing unprecedented economic constraints. The resources needed to implement all of the proposed Action Plans are not available. For this reason, the Plastics Strategy Team has assessed which Action Plans should be undertaken immediately, and which may be deferred to a later date. Where possible, however, timetables will be shortened to accelerate efforts to further divert plastics from disposal

The Action Plans which could be considered of critical importance in the short-term include those that are prerequisites for change, offer significant waste diversion potential, build on existing structures and successes, or otherwise embody the priorities identified by the Plastics Strategy Team. The Primary Action Plans (followed by the lead agencies responsible for their development) are:

#3. Implement Municipal Processing Cost Model (EPIC, WRO)
#8. Select Key IC&I Resins for Immediate Diversion (EPIC)

#9. Implement Plan for Diverting Key IC&I Resins (EPIC)
#10. Develop Plan for Diverting Residential Non-Durables (AMRC)
#13. Develop Immediate Marketing Initiatives for Post-Consumer Resins (EPIC, OMMRI)
#14. Develop Long-Term Marketing Initiatives for PCR (EPIC, OMMRI)
#15. Develop a Procurement Strategy for PCR (MBS)
#21. Develop an Integrated 3Rs Communications Strategy (EPIC)

The Plastics Strategy Team has suggested a select number of lead agencies that could most expeditiously undertake these high priority plans. Lead agencies would be accountable for Action Plan implementation. They would be asked, at the earliest possible date, to indicate their commitment to complete the proposed Action Plan(s), review and refine the plan(s), assess the external support necessary (if any), and begin implementation as soon as possible.

To sustain the current momentum and cooperative spirit of the stakeholders, it is recommended that a progress meeting be scheduled for September, 1994, in order that lead agencies can report on the progress made in implementing their selected Action Plans. Written proceedings could be produced and distributed to all interested stakeholders.

"Defining a Plastics Diversion Strategy" reflects the commitment of the plastics industry, municipalities and other stakeholders to waste reduction. The priority Action Plans represent feasible and practical opportunities for implementing the 3Rs and other resource recovery options. They will develop the data and techniques needed to maximize the diversion of plastics from disposal and the conservation of this important resource.

In addition, the importance of maintaining a "level playing field" is generally and widely recognized by the stakeholders. The MOEE supports the concept of the "level playing field" and is working to incorporate the principle into its waste management programs and policies.

However, waste reduction and diversion is a complex undertaking. To date, not all of the outstanding issues crucial to maximizing the diversion of plastics from disposal have been resolved, nor has consensus been achieved among all the participating stakeholders on a number of important issues:

* the question of who pays for the implementation of 3Rs activities, such as the establishment of collection, sorting and recycling infrastructure, pilot programs, technology research and development, education and training, etc.;

* the role of tertiary recycling (another technique for diverting plastics from disposal) which is being addressed through initiatives in Europe, the United States and Japan;

* the impact of GATT, NAFTA and other international developments on the recycling infrastructure and the viability of markets for post-consumer resins (PCR);

* the roles and responsibilities of the private and public sectors for implementing and financing plastic resource diversion activities; and

* the role of energy-from-waste initiatives and other components of an integrated resource management approach to further the diversion of plastics from disposal.

The activities of the Plastics Strategy Team has opened the lines of communication among governmental, nongovernmental, industry and municipal representatives. It is anticipated that these issues will be addressed during continuing discussions among individual stakeholders.

INTRODUCTION

The Plastics Strategy Team is a multi-stakeholder committee of private and public sector representatives which was assembled at the invitation of the Waste Reduction Office to assess the current waste diversion activities of the plastics industry, municipalities and provincial agencies, and provide a blueprint for building on those successes. The strategy team considered those plastics that may be found in the municipal solid waste stream, including both residential wastes and those generated by the Industrial, Commercial and Institutional (IC&I) sector.

This report describes the results of their deliberations, addresses the current barriers to increased diversions, and proposes a series of initiatives designed to address these challenges. In addition, the status of current waste reduction efforts are highlighted. The report was developed according to the following statement of purpose:

> "Through multi-stakeholder consultation and employing the concepts of sustainable development the Plastics Strategy Team proposes: to develop a multi-faceted implementation plan which would maximize the diversion of plastics from the waste stream and contribute to provincial waste diversion targets."

Chapter 1 of the report, "Development of a Plastics Diversion Strategy," describes the membership, organization and work of the Plastics Strategy Team. The stakeholders assembled and solicited members for a series of six subcommittees: a Reduce/Reuse Task Group, Municipal Infrastructure Task Group, IC&I Infrastructure Task Group, Market Development Task Group, Regulatory Task Group, and Information Task Group. Each group was assigned the task of identifying the barriers to plastics diversion and proposing specific Action Plans that would overcome them. This chapter also describes a series of key elements that must be addressed by a Plastics Diversion Strategy.

Chapter 2, "Setting Priorities for the Action Plans," covers a series of priority-setting principles that may be used in assessing which Action Plans should be pursued immediately and which may be deferred until a later date.

Chapter 3, "The Barriers to Diverting Plastics from disposal," covers those existing technological, economic, perceptual and regulatory impediments to establishing an effective and efficient resource conservation program for plastics.

Chapter 4, "Development of the Action Plans," describes how the individual Action Plans were drafted, and organizes them into six related categories: (1) Background Information, (2) Diversion Initiatives, (3) Market Development, (4) Education & Communications, (5) Tracking & Monitoring, and (6) Regulatory & Nonregulatory Policies.

Chapter 5, "Implementing the Action Plans," recommends how the members of the Plastics Strategy Team can overcome short-term constraints on resources and act upon the most immediate of the proposed Action Plans. A select number of lead agencies are recommended for implementing the plans identified as being the highest priority.

This report concludes with a series of Appendices, including a list of common acronyms (Appendix A), a glossary of technical terms (Appendix C), the original Terms of Reference of the Plastics Strategy Team (Appendix D), and a list of organizations, government agencies, municipalities and companies that contributed to the work of the Plastics Strategy Team and/or its Task Groups (Appendix E).

The full texts of the detailed Action Plans can be found in Appendix B. These are organized in accordance with the six categories described in Chapter 4. Each plan contains a statement of purpose, the expected duration (necessary for completion), a series of steps required for achieving planned objectives, a recommended lead agency that could be responsible for its implementation, and a list of any related programs or agencies/organizations that could share similar goals.

Appendix F, "Plastics in Ontario," is designed to provide the background context for the proposed plastics diversion strategy. It summarizes current plastic resin production, use and disposal, and describes the solid waste management and waste diversion activities practiced by the plastics industry, municipalities and government agencies in this province.

Chapter 1

DEVELOPMENT OF A PLASTICS WASTE DIVERSION STRATEGY

In May, 1992, the Waste Reduction Office, a branch of the Ontario Ministry of Environment and Energy, invited a group of stakeholders to participate as part of a strategy team and share their concerns and perspectives on ways to maximize the diversion of plastics from the municipal solid waste stream. The stakeholders represent a variety of key groups — including the plastic industry (resin producers, convertors, brand owners, retailers and recycling companies), municipalities, labour and environmental groups, and government agencies — who share an interest in the production, use, disposal and resource conservation opportunities for plastics in Ontario.

Under its Waste Reduction Action Plan, the Ontario government is committed to meeting provincial waste reduction targets of 25 percent by the end of 1992 and 50 percent by the year 2000. The government has recognized that it cannot achieve this goal alone. The multi-stakeholder strategy team was created to ensure that those who are affected by the shift to a conserver society have an opportunity to contribute to Ontario's long-term waste management policies.

On June 23, 1992, the first meeting of the newly created Plastics Strategy Team addressed the proposed Terms of Reference which originally incorporated three main objectives (a fourth was added following discussion):

Objective 1:	to develop a strategy to divert the amount of plastic going to disposal, and that will build upon and complement current initiatives;
Objective 2:	to determine the full cost of waste management and who should share in it;
Objective 3:	to identify waste reduction opportunities and develop markets for post-consumer resins; and
Objective 4:	to establish an integrated waste management system that includes waste reduction, alternative uses of residual plastic wastes, and landfill.

In its letter of invitation, the Waste Reduction Office also asked the Plastics Strategy Team to consider:

* market development initiatives for post-consumer resins (PCR);
* new product designs to enhance waste reduction;
* options for prolonging the durability of plastics applications;
* opportunities for expanding the municipal Blue Box program to include all plastics;
* joint plans to divert plastics from the IC&I sector;

* levels of recycled content requirements in existing and new products;
* working with the National Task Force on Packaging;
* communications programs to support diversion and uses of post-consumer resins; and
* the establishment of an integrated waste management system that includes waste reduction and landfill.

The Terms of Reference offered a starting point for discussion among the stakeholders and served as the basis for cooperation. The Strategy Team agreed that it would identify barriers that inhibit the diversion of plastics from disposal, and to propose and initiate solutions aimed at minimizing the waste of plastic resources. The team agreed to discuss the full range of 3Rs options and identify the best means of achieving the significant diversion of plastics from disposal. Objectives 1, 3 and 4 would be met through the creation and implementation of a series of Action Plans that, collectively, would form a plastics diversion strategy.

To date, the resolution of Objective 2 has not been addressed. However, it is recognized that this final element is being clarified through a number of more broadly-based forums, such as the development of the packaging industry's product stewardship model and direct negotiations between officials from the MOEE and selected industries.

The Plastics Strategy Team organized itself into a number of Task Groups in order to offer participants a greater opportunity to focus their contribution as part of a smaller working group. Six Task Groups were formed to cover the following subject areas:

* reduction and reuse,
* residential infrastructure,
* IC&I infrastructure,
* market development,
* regulatory issues, and
* information and education issues.

The Task Groups convened initially in August and September, 1992, in order to develop a consensus on future action to be taken. A distinctive Mission Statement was developed by each group to eliminate potential for overlap and to scope the review in an appropriate manner.

TASK GROUP MISSION STATEMENTS

Reduce/Reuse Task Group
"To develop criteria and design systems which will evaluate the use of plastics in durable and non-durable applications while encouraging new techniques to meet waste diversion targets."

Municipal Infrastructure Task Group
"To develop an implementation plan for the recycling of residential plastics which achieves provincial waste diversion targets and which addresses the concerns and issues of municipalities, recyclers, the industry and the public."

IC&I Infrastructure Task Group
"To develop an implementation plan for the recycling of IC&I plastics which achieves provincial waste diversion targets and which addresses the concerns and issues of generators, recyclers, the industry and the public."

Market Development Task Group
"To develop an integrated industry and government-supported implementation plan to stimulate the diversion of post-consumer resins into productive use in a cost-effective and technically efficient manner consistent with waste diversion targets."

Regulatory Task Group
"To review, assess and recommend guidelines, economic instruments and regulatory measures which will enhance the diversion of plastic products from the waste stream."

Information Task Group
"To assemble, analyze and disseminate information on product applications for plastic and to inform the public and other users on plastic waste diversion."

KEY ELEMENTS OF A PLASTICS DIVERSION STRATEGY

The Plastics Strategy Team recognized the critical importance of integrating collection and processing plans with economically viable markets for recycled resins. In developing the Action Plans that would comprise its diversion strategy, the Team placed first priority on identifying and removing any significant roadblocks and barriers that inhibit the optimum diversion of plastics from disposal. A series of fundamental principles were proposed to guide the development of the final diversion strategy.

The strategy should stimulate informed debate on the role of plastics in a waste diversion program and work towards building consensus among the primary stakeholders.

The plastics diversion strategy should provide a logical, functional umbrella under which the plastics industry, its customers and policy-makers can work together to develop and implement a strategic, action-oriented program for the responsible diversion and recovery of plastics that addresses recognized public interests and concerns. The roles plastics play in today's world should be articulated clearly in order that the plastics industry, policy-makers and consumers can make informed decisions about the environmental impacts of the industry's products.

The strategy should help ensure stable markets for post-consumer resins.

A coordinated implementation plan should be developed to stimulate the diversion of plastics into productive, sustainable uses in a cost-effective and technically efficient manner which contributes to provincial waste diversion targets.

The strategy should ensure that sufficient, cost-effective and technically-efficient collection and recycling capacity exists, now and in the future.

Existing processing capability should be optimized to accommodate collected materials and ensure that sufficient new capacity is available to process those plastic materials coming on stream. It should be ensured that an adequate collection infrastructure is in place to accept residential and IC&I plastics in a cost-effective and technically efficient manner. Whenever possible, efforts should build upon successful industry programs that have proven their effectiveness in addressing stakeholder concerns and delivering positive results.

The strategy should support the development of suitable reduction, reuse and recycling technologies.

A solid technical foundation for clarifying and, where necessary, improving the environmental performance of plastics should be provided through the advancement of technological developments to facilitate private and public programs to reduce, reuse and recover plastic materials. It should be ensured that such programs are responsive to public concerns, protective of the environment, sensitive to issues of public health and safety, and economically feasible.

The strategy should emphasize the effectiveness of voluntary compliance instruments for achieving diversion.

Voluntary guidelines, economic and technical instruments which will enhance the diversion of plastic products from the waste stream should be developed, assessed and recommended, consistent with provincial waste diversion targets, thereby removing the need to impose compulsory or regulatory measures. If voluntary efforts do not prove effective, it is recognized that regulatory approaches will be considered.

The strategy should recognize and work to maintain the competitive position of the Ontario plastics industry.

The strategy should reflect a commitment, in both actions and words, which ensures that plastics are considered by the general public, policy-makers and customers on the basis of efficient use of resources, functional performance and health, safety and environmental benefits throughout their life cycle. These product benefits will continue to have a positive effect on society as well as the industry's growth, image and success.

Chapter 2

SETTING PRIORITIES FOR THE ACTION PLANS

The Plastics Strategy Team realized that in order to make the most effective use of the available personnel and resources, it would have to prioritize the programs and research activities it was recommending be undertaken in its proposed Action Plans. The Action Plans would stimulate short-term solutions while identifying long-term opportunities. The following principles could be used in ranking and scheduling the Action Plans.

Priority is given to evaluating the 3Rs hierarchy as the first stage in diverting plastics from disposal.

All sectors have recognized that resource conservation — the need to use resources wisely — is preferable to wastefulness. The general approach for planning waste diversion activities is to follow the 3Rs hierarchy of reduction, reuse and recycling. Once these 3Rs options have been fully evaluated and programs implemented, as appropriate, consideration should be given to diverting the remaining plastic materials from disposal by processing them into their basic raw materials or using them as an energy source. Each waste diversion option must be fully assessed with respect to its economic and environmental impacts.

Priority is given to identifying and diverting key resins.

Action Plans have been established to facilitate the diversion of key resins on a priority basis, based on selection criteria which will identify such factors as diversion potential, cost, and the status of collection, processing and marketing capabilities for each resin type.

Priority is given to identifying and developing markets for key resins.

The strategy recognizes the critical importance of integrating collection and processing plans with economically-viable markets for recycled post-consumer resin. Priority has been placed on taking immediate steps to stimulate PCR consumption in the short-term, which can facilitate the development of new market opportunities in the long-term.

Priority is given to diverting nondurable plastic products. Durables would be addressed over the longer term.

Action Plans have been established which place priority on the development of diversion programs for short-lived (nondurable) plastics, falling largely into the packaging sphere. Priority will be placed on diverting this material, while at the same time examining in the longer term how durable plastic products, largely derived from the scrapping of consumer goods, could be diverted from residential and IC&I waste streams.

Priority is given to diverting plastics from disposal through integration with existing 3Rs programs.

The implementation of 3Rs programs that deal with plastics waste diversion strategies need to be integrated with programs that include diversion of other materials from disposal. Priorities on implementing these waste diversion programs include an integrated 3Rs approach with education on reduction, reuse and recycling. Where possible, IC&I plastic wastes recycling/ reuse systems should be made compatible with those systems already developed in the residential sector. IC&I sectors that generate substantial quantities of plastics waste will be identified and targeted first. Residential recycling initiatives are well developed across Ontario; existing infrastructure would be retained and improved upon where appropriate.

Chapter 3

THE BARRIERS TO DIVERTING PLASTICS FROM DISPOSAL

The Plastics Strategy Team has identified a number of barriers to maximizing the diversion of plastics from disposal. Almost all the identified barriers have an economic component, from the undervalued cost of landfilling and other disposal alternatives ... to the current economics of, and cost allocations for plastics collection, separation and recycling ... to the markets for the recovered resins and their ability to compete with virgin and off-grade resins. Other barriers may be regulatory, technical or even perceptual.

Successful diversion programs require a fundamental shift in the way individual stakeholders view plastics, as a resource rather than a waste. Plastic resins are derived, in the main, from a non-renewable resource and should be conserved through the implementation of all 3Rs. The need for education and information sharing among all the stakeholders — including the general public, environment groups, elected officials, and regulatory agencies, as well as the plastics industry — underlies many of the roadblocks.

A number of barriers are technical and specific to the plastics sector and the products they produce. The not-so-simple mechanics of separation and processing (either primary, secondary or tertiary) are complicated when a recycler is faced with a mix of plastics of different resin types, colours and grades.

Several barriers relate to the regulatory incentives and disincentives used to manage wastes in Ontario and Canada. Economics may be the primary determinant in the viability of recycling and other 3Rs initiatives. Other factors are important in delivering resin feedstocks to the recycling plant gates. Innovative municipal tipping fees and Blue Box collection programs, mandatory provincial source separation and recycling requirements, national packaging protocols, and progressive purchasing policies by all levels of government are all important factors that need to be pursued more vigorously in order to maximize the diversion of plastics from disposal.

And all the roadblocks and barriers are rooted in the geography of Ontario, its scattered population and industry, and endless highways. What works in the industrialized Golden Horseshoe of Southern Ontario may not necessarily be applicable in Northern Ontario.

It's obvious that the barriers overlap considerably. They fluctuate in their relative importance with subtle shifts in the economic and regulatory environments. Changes in crude oil prices or landfill tipping fees can inflict major disruptions up and down the recycling network.

To simplify the situation, these barriers are grouped into five major categories that are arranged in sequence, from the fabrication and use of the plastic products, through the collection and processing of the plastic scrap from IC&I and residential waste sources, to the marketing of the recovered resins. Again, there is a fair degree of overlap, but this arrangement may help identify those barriers that are specific to the plastics sector and those that are common to other waste diversion initiatives.

Barrier #1
Many of the stakeholders whose active participation is essential to the success of a plastics diversion program lack the necessary information on reduction, reuse and recycling opportunities.

* The general public overestimates the impact plastic wastes have on Ontario's waste disposal problems. Plastics only represent an estimated 4% by weight or 13-15% by volume of the municipal solid waste stream. This may, for example, create a bias against using plastics to replace other bulkier or more wasteful packaging systems which have a greater environmental impact.
* Many IC&I generators are unaware of how reusable, refillable plastic packaging and storage systems can reduce their own and their customers' waste generation totals.
* Many IC&I generators are unaware of the opportunities for in-house waste reduction and reuse, or commercial plastic scrap recycling.
* Many new plastic products are not designed with consideration of their future 3Rs implications.
* Developments in reduction, reuse and recycling technologies are not widely publicized or communicated through the plastics sector.
* While some good written materials on plastics recycling in the IC&I sector are available, there few training courses or seminars offered.
* Reliable information on plastic production, use and disposal, needed for planning an integrated waste diversion program, is not readily available.

Barrier #2
The cost of collecting and reusing/recycling plastics from the IC&I and residential sectors is currently too high to compete with landfilling in many communities.

* There is continuing debate over the actual costs of collection, sorting, processing and other 3Rs activities, and there is no basis for agreement on how those costs should be shared among the major public and private sector stakeholders. This is inhibiting the implementation and expansion of both residential and IC&I diversion programs.
* There is no mechanism in place to incorporate or accomodate the environmental costs incurred during the production/use of either virgin plastic or PCR.
* The current low cost of landfilling in many Ontario communities and across the border in the U.S. makes it difficult for plastic recyclers to compete for feedstocks.
* Collection is responsible for much of the cost of plastic recycling. There is a great deal of uncertainty about the optimum system for collecting residential and IC&I plastics.
* Plastic scrap has a high volume-to-weight ratio, meaning one can't fit as much plastic as glass or steel on a truck. If compressed too tightly, mixed scrap is more difficult to separate at the

recycling facility.

* There are currently a lack of incentives (such as grants, low-interest loans or other funding instruments) to encourage the implementation of viable 3Rs programs among small and medium-sized IC&I waste generators.

* The tipping fees charged by landfill sites represent a valued revenue stream to many municipalities and private sector operators. This may act as a disincentive to the diversion of wastes from landfill.

Barrier #3

It is currently very difficult to separate and process a number of plastic resins.

* There are a variety of resin types and a multitude of colours in commercial use. The currently-available commercial technologies for separating mixed plastic resins in material recycling facilities must be made more efficient and less expensive.

* Potentially recyclable plastics may be contaminated with gasoline, oil, pesticides and other residues, or mixed with dirt, organics and other wastes. These are difficult or expensive to remove. If they are not separated, the value of the PCR is considerably reduced.

* The development of more efficient and/or cost-effective technology is needed in the areas of collection optimization, automatic sortation and tertiary recycling. As new 3R technologies are introduced, it may be necessary to refine the pollution abatement technologies used to control any resulting odours, liquid effluents and air emissions.

* There is also a need for greater efficiency in IC&I and residential source separation systems and curbside pickup and separation programs.

Barrier #4

The recycling and reuse industry lacks the stability needed to ensure adequate long-term processing capacity.

* Tipping fees vary widely between communities, and may be raised or reduced without regard for their impact on the economic viability of the 3Rs infrastructure.

* Without the assurance of a stable recycling infrastructure, generators cannot plan and implement waste diversion programs on a solid business basis.

* There are no guidelines, similar to the National Packaging Protocol, or the Canadian Code or Preferred Packaging Practices, that would promote the voluntary diversion of durable plastics from disposal through 3Rs practices.

* Many areas of the province are not served by a cost-effective plastics collection system, recycling facilities to process the resins that are generated, or adequate facilities for the repair and refurbishing of reusable plastic products.

Barrier #5
The current markets for post-consumer resins are not stable.

* The development of markets for post-consumer resins (PCR) have not kept pace with the growing capacity of the recycling infrastructure for residential and IC&I resins.

* Without guaranteed feedstocks from IC&I and residential sources, recyclers, in turn, cannot always ensure either the supply of PCR or consistency of quality in PCR.

* Many procurement guidelines do not require and/or allow a recycled content or offer equal treatment for PCR. Government and major industry buyers need to provide leadership in this area and support the purchase of products certified to contain the highest possible level of PCR that meets quality specifications.

* While recognizing the value of recycling post-industrial resins (or scrap), this material may "masquerade" as PCR in the products or packaging of certain manufacturers that promote their recycled content. This practice may confuse consumers and act to decrease the market for legitimate PCR. Federal environmental labelling guidelines (currently in their second draft) need to be promoted and routinely enforced.

* Many product specifications, such as those that specify particular virgin resins, may work against the use of PCR. Performance-based standards would permit the use of PCR that meets the demands of the product. However, this is a relatively new industry and much of the performance data needed to support the use of PCR have not been developed.

* Merchandisers may reject PCR on the basis of aesthetic imperfections or colouring limitations that may affect consumer appeal but do not, otherwise, affect performance or resin quality.

* Technical limitations, conflicting or restrictive regulations, and health and safety concerns restrict the closed-loop recycling of food contact packaging. Quality problems caused by contamination with household hazardous wastes, solid wastes and other resins may limit other markets for PCR.

* In some cases today, the PCR cost/value ratio is not competitive with the cost/value of virgin and off-grade resins.

* Recycling is a labour-intensive operation, especially when compared with the production of virgin resins. High costs incurred during collection, sorting, washing and processing can make PCR non-competitive.

* In the past, the price of virgin and off-grade resin stocks have fluctuated and may, on occasion, affect the competitive price of PCR.

* Inadequate incentives are available to support the sustainable use of PCR, or the development of products that would increase the markets for PCR.

Chapter 4

DEVELOPMENT OF THE ACTION PLANS

Each Task Group cooperatively developed a set of detailed Action Plans that collectively form a strategy for diverting plastics from disposal. The Action Plans were designed through a process that began by identifying barriers and roadblocks to waste diversion and concluded by highlighting 3Rs opportunities for waste minimization.

The Action Plans describe a variety of 3Rs initiatives that could be developed over the short term. These build upon the existing efforts already underway and complement provincial efforts to divert solid wastes from disposal.

Each Action Plan includes a series of standard components that outlines the objective(s) and the specific steps that must be taken to fully realize that objective. A common format was developed for presenting the proposed Action Plans, incorporating:

* a descriptive title and identification number,
* a statement of purpose,
* an estimate of the expected duration of the plan,
* a chronology of key steps required to achieve the stated objectives,
* a recommended lead agency that could undertake those steps, and
* any organizational or program linkages.

The expected duration of the Action Plans range from three months up to two years; some include on-going components. They are categorized under the following six headings:

* Background Information;
* Diversion Initiatives;
* Market Development Initiatives;
* Education & Communications;
* Tracking & Monitoring; and
* Regulatory & Nonregulatory Policies.

Background Information

This category represents the "library" of information to be made available to the multi-stakeholder participants. It is comprised of Action Plans which will provide the basis for subsequent activities. Comprehensive and common understanding of these factors will assist all stakeholders in contributing to provincial waste diversion targets. The key elements of the category are:

1. to identify the constraints and barriers to the diversion of plastics in the solid waste stream and their effective recovery/reuse;
2. to assemble previously developed information to be used for strategy development and stakeholders knowledge; and
3. to analyze the processing cost for material recovery facilities.

Background Information Action Plans
1. Compile 3Rs Design Guidelines for Packaging
2. Compile Catalogue of Plastics Environmental Information
3. Implement Municipal Processing Cost Model
4. Communicate 3Rs Design Guidelines for Durables
5. Identify Issues, Barriers and Needs of Brand Owners
6. Characterize Plastic Materials Used for the Production of Durables
7. Evaluate Available Technologies for Tertiary Recycling

Diversion Initiatives

This category "captures" the diversion initiatives, both short-term and long-term, for achieving the required diversion targets. Expediting resource recovery of high priority plastic streams will provide the overall program with momentum and boost to the Ontario effort. The key elements of the category are:

1. to target specific IC&I plastics which are available for immediate diversion; and
2. to target plastics from residential durable and non-durable sources.

Diversion Initiatives Action Plans
8. Select Key IC&I Resins for Immediate Diversion
9. Implement Plan for Diverting Key IC&I Resins
10. Develop Plan for Diverting Residential Non-durables
11. Develop Plan for Diverting Residential Durables
12. Gather and Diseminate 3Rs Design Standards for Durable Products

Market Development

This category combines Action Plans which address current market supply conditions and market development requirements. Development of sustainable, consistent PCR markets is fundamental to the success of plastics diversion. The key elements of the category are:

1. to develop a comprehensive PCR market development strategy; and
2. to initiate priority market development.

Market Development Action Plans

13. Develop Immediate Marketing Initiatives for PCR
14. Develop Long-Term Marketing Initiatives for PCR
15. Develop a Procurement Strategy for PCR
16. Define Market Development Needs (Residential)
17. Evaluate Use of PCR in Non-Durables

Education & Communications

Action Plans related to a comprehensive information and education strategy are contained in this category. Effective education and communication strategies will provide stakeholders with a common understanding of current plastics diversion issues and activities. The key elements are:

1. to develop an integrated communications strategy and implement detailed Action Plans related to 3Rs initiatives;
2. to assess and implement enhanced school curriculum programs as required; and
3. to develop required training programs to support ongoing plastics environmental initiatives.

Education & Communications Action-Plans

18. Compile 2Rs Case Studies
19. Enhance School Curriculum
20. Develop and Implement Training Programs
21. Develop an Integrated 3Rs Communications Strategy
22. Develop 3Rs Fact Sheets
23. Disseminate Life Cycle Analysis Information

Tracking & Monitoring

Management and"delivery" of the Plastics Strategy requires an centralized performance monitoring or tracking system. This category consists of Action Plans devoted to compiling the required management information that tracks progress and confirms planning assumptions. Feedback data will ensure that adjustments in emphasis can be made to exploit unanticipated opportunities and optimize the use of resources. The key elements of this category are:

1. to monitor the performance of existing 3Rs initiatives and actions arising from plans contained herein;
2. to ensure plastics collection programs are keeping pace with the growth in processing capacity; and
3. to assess the impact of 3Rs initiatives on PCR supply and demand.

Tracking & Monitoring Action Plans
24. Provide Quarterly Advice to MOEE on Plastics Designation in the Ontario 3Rs Regulation
25. Develop a Mechanism to Track Impact of 3Rs Strategy
26. Develop a Mechanism to Track Plastics Use/Disposal
27. Evaluate Development of Residential Collection Programs

Regulatory & Nonregulatory Policies

The success of certain Action Plans may require the proper balance of voluntary guidelines, economic instruments and regulatory initiatives if appropriate. There may be some stakeholders who will not voluntarily comply with Action Plans and as a result, a policy, standard regulation or economic instruments may be required. It is recognized that the MOEE retains full responsibility for provincial requirements and policies related to 3Rs. Advice arising from the implementation of the proposed Action Plans in this section will be considered along with that received from other sources. The key elements of this category are:

1. to compile available regulatory "tools"
2. to define "level playing field" criteria; and
3. to develop and implement initiatives, as required, to meet emerging issues.

Regulatory & Nonregulatory Policies Action Plans
28. Compile Inventory of Regulatory and Policy Issues
29. Evaluate Effectiveness of Voluntary/Mandatory Policy Tools
30. Evaluate Effectiveness of Labelling, Advertising and Coding
31. Evaluate Policy Instruments Needed to Divert IC&I Plastics Packaging

Chapter 5

IMPLEMENTING THE ACTION PLANS

More than a year of work has gone into identifying the barriers hampering the diversion of wastes from disposal and developing specific Action Plans to address and overcome those barriers. The stakeholder organizations, municipalities and companies that comprise the Plastics Strategy Team and its Task Groups have worked together to develop 31 such plans. These are listed in Table 1.1.

The Action Plans are the end product of a significant investment of time, expertise and resources on the part of the stakeholders. At the same time, the development process has enabled the participants to share concerns, develop a common base of data and information, and begin forging plans and strategies which could benefit all stakeholders over the long term.

However, all stakeholders are experiencing unprecedented economic constraints. The resources needed to implement all of the proposed Action Plans are simply not available. In order to move the process forward, the Plastics Strategy Team assessed which Action Plans should be undertaken immediately, and which may be deferred to a later date.

Table 1.2, "Primary Action Plans," lists those plans that are considered prerequisites for change, offer significant waste diversion potential, build on existing structures and successes, or otherwise embody the priorities identified by the Plastics Strategy Team.

Table 1.3, "Secondary Action Plans," lists those plans that do not meet priority objectives or whose contribution to waste diversion is, as yet, undetermined. It is proposed that these Action Plans be deferred until the resources needed for their implementation are available.

Table 1.4, "In Progress Action Plans," lists those plans that have been undertaken by one or more stakeholder groups, obtained pledges of sponsorship and/or have had adequate resources dedicated to their continuing implementation.

Several of the Action Plans are designed to monitor the activities and programs initiated under the other plans and suggest modifications as necessary (Tracking Action Plans, Table 1.5). The Waste Reduction Office has made a commitment to undertake certain aspects of these plans.

Agencies' Roles and Responsibilities

It is the position of the Plastics Strategy Team that all plastic materials are a potential resource. To maximize the utilization of this resource, future action among stakeholders must be developed in a way that makes the best use of resources targeted towards diverting plastics from disposal. Because interest in the wise utilization of plastics is shared by so many, a cooperative stakeholder approach is essential.

Stakeholders participating on the Plastics Strategy Team have derived consensus on advice to agencies that can bring about change. Specific advice is expressed in the form of proposed Action Plans that are intended for implementation by a select group of lead agencies (see Table 1.1). Other organizations are also identified as important contributors of support to the agencies taking a lead role.

Proposed action plans address a wide range of plastics diversion initiatives. The major areas of focus within which specific Action Plans are proposed include background information, specific diversion initiatives, education and communication, market development for recyclables, regulatory and non-regulatory policy, and progress tracking. Although the duration of proposed initiatives is estimated in this report for all the Action Plans, further plan refinements by the lead agencies will improve the projections of delivery timetables.

Accountability and delivery timetables are considered to be of particular importance in the design of Action Plans. Where possible, timetables will be shortened to accelerate efforts to further divert plastics from disposal. Specific lead agencies will be asked to coordinate the completion of each Action Plan. Other agencies that are well positioned to provide assistance to lead agencies are also identified in the Action Plan category "program/organizational linkages." Cooperation is an essential ingredient in the efficient and effective implementation of all Action Plans.

Required Commitment

The overall success of the collective 3Rs strategy proposed by the Plastics Strategy Team depends upon the receipt of "expressions of commitment" from the agencies identified to take on the lead role for each and every Action Plan. Lead agencies identified as such are urged to consider the Strategy Team's request. The request calls for the identified lead agencies to confirm their acceptance of the lead, review and refine the proposed Action Plans, and begin implementation at the earliest opportunity.

In support and on behalf of the Plastics Strategy Team's request, the MOEE's Waste Reduction Office asks for a progress letter from each of the specified agencies by May 31, 1994. The progress letter would outline the specific task or tasks, refinements to the proposed Action Plans where appropriate (i.e. objectives, key steps, delivery timetables, resources) and a clear indication of where external support is needed to achieve the final steps of each plan. To sustain the current momentum and cooperative spirit of the broad stakeholder group, a progress meeting is proposed for September, 1994, to hear presentations on achievements derived from the implementation of Action Plans. Proceedings of such a progress meeting would be documented for the collective benefit of all participants, and suggestions considered for further improvements where appropriate.

Considerable time and effort by the Strategy Team participants have been expended during the past twelve months. A new focus aimed towards the cooperative implementation of plans will help to ensure the wise use of plastics in Ontario.

TABLE 1.1

PROPOSED ACTION PLANS

NO.	ACTION PLAN	CATEGORY (See Tables 1.2, 1.3, 1.4 and 1.5)	SUGGESTED LEAD AGENCY
	Background Information		
1.	Compile 3Rs Design Guidelines for Packaging	Secondary	GPMC
2.	Compile Catalogue of Plastics Environmental Information	In Progress	EPIC
3.	Implement Municipal Processing Cost Model	Primary	EPIC/WRO
4.	Communicate 3Rs Design Guidelines for Durables	Secondary	EPIC
5.	Identify Issues, Barriers and Needs of Brand Owners	In Progress	GPMC
6.	Characterize Plastic Materials Used for the Production of Durables	Secondary	EPIC
7.	Evaluate Available Technologies for Tertiary Recycling	In Progress	EPIC
	Diversion Initiatives		
8.	Select Key IC&I Resins for Immediate Diversion	Primary	EPIC
9.	Implement Plan for Diverting Key IC&I Resins	Primary	EPIC
10.	Develop Plan for Diverting Residential Non-Durables	Primary	AMRC
11.	Develop Plan for Diverting Residential Durables	In Progress	AMRC
12.	Gather and Disseminate 3Rs Design Standards for Durable Products	Secondary	EPIC/MEDT
	Market Development		
13.	Develop Immediate Marketing Initiatives for PCR	Primary	EPIC/OMMRI
14.	Develop Long-Term Marketing Initiatives for PCR	Primary	EPIC/OMMRI

TABLE 1.1 (cont'd)

NO.	ACTION PLAN	CATEGORY (See Tables 1.2, 1.3, 1.4 and 1.5)	SUGGESTED LEAD AGENCY
15.	Develop a Procurement Strategy for PCR	Primary	MBS
16.	Define Market Development Needs (Residential)	In Progress	OMMRI
17.	Evaluate Use of PCR in Non-Durables	Secondary	GPMC
	Education & Communications		
18.	Compile 2Rs Case Studies	In Progress	WRO/AMRC
19.	Enhance School Curriculum	In Progress	EPIC/SPI
20.	Develop and Implement Training Programs	Secondary	EPIC/CPI
21.	Develop an Integrated 3Rs Communications Strategy	Primary	EPIC
22.	Develop 3Rs Fact Sheets	Secondary	AMRC/EPIC
23.	Disseminate Life Cycle Analysis Information	In Progress	EPIC
	Tracking & Monitoring		
24.	Provide Quarterly Advice to MOEE on Plastics Designation in the Ontario 3Rs Regulation	Tracking	EPIC
25.	Develop a Mechanism to Track Impact of 3Rs Strategy	Tracking	WRO
26.	Develop a Mechanism to Track Plastics Use/Disposal	Tracking	WRO
27.	Evaluate Development of Residential Collection Programs	Tracking	AMRC
	Regulatory & Nonregulatory Policies		
28.	Compile Inventory of Regulatory and Policy Issues	In Progress	EPIC
29.	Evaluate Effectiveness of Voluntary/Mandatory Policy Tools	In Progress	WRO/AMRC/EPIC
30.	Evaluate Effectiveness of Labelling, Advertising and Coding	Secondary	EPIC
31.	Evaluate Policy Instruments Needed to Divert IC&I Plastics Packaging	Secondary	EPIC

TABLE 1.2 : PRIMARY ACTION PLANS

ID NO.	ACTION PLAN	LEAD AGENCY	ORGANIZATIONAL LINKAGES
3.	Implement Municipal Processing Cost Model	EPIC/WRO	AMRC, OMMRI, AMO, MRF Operators, Recyclers, Municipalities, Marketing Publications
8.	Select Key IC&I Resins for Immediate Diversion	EPIC	Generators, Haulers, Reprocessors, GPMC, CCGD, PFMA
9.	Implement Plan for Diverting Key IC&I Resins	EPIC	Generators, Haulers, Reprocessors, GPMC, CCGD, PFMA
10.	Develop Plan for Diverting Residential Non-Durables	AMRC	MOEE, RCO, OMMRI, EPIC
13.	Develop Immediate Marketing Initiatives for PCR	EPIC/OMMRI	WRO, AMRC, Haulers
14.	Develop Long-Term Marketing Initiatives for PCR	EPIC/OMMRI	WRO, GPMC, CCGD
15.	Develop a Procurement Strategy for PCR	MBS	GIPPER, MEDT, EPIC, AMO, CPRA
21.	Develop an Integrated 3Rs Communications Strategy	EPIC	AMRC, WRO, RCO

Primary Action Plans - plans considered to be of critical importance that should be undertaken immediately.

TABLE 1.3 : SECONDARY ACTION PLANS

ID NO.	ACTION PLAN	LEAD AGENCY	ORGANIZATIONAL LINKAGES
1.	Compile 3Rs Design Guidelines for Packaging	GPMC	CSA, EPIC, PAC, MOEE, RCO
4.	Communicate 3Rs Design Guidelines for Durables	EPIC	MOEE, CCME, EPA, CMA, SAE, ASTM, CARI, American Plastic Council
6.	Characterize Plastic Materials Used for the Production of Durables	EPIC	SPI, AMRC, OWMA, WRO, Recyclers
12.	Gather and Disseminate 3Rs Design Standards for Durable Products	EPIC/MEDT	CARI, WRO, CMA, AMRC, CSA, Federal & Provincial Governments
17.	Evaluate Use of PCR in Non-Durables	GPMC	RCO, AMRC, PAC
20.	Develop and Implement Training Programs	EPIC/CPI	OETC, SPI, AMRC, RCO, MOEE, Consumers Association of Canada
22.	Develop 3Rs Fact Sheets	AMRC/EPIC	RCO, MOEE
30.	Evaluate Effectiveness of Labelling, Advertising and Coding	EPIC	RCO, MOEE, Consumer and Corporate Affairs
31.	Evaluate Policy Instruments Needed to Divert IC&I Plastics Packaging	EPIC	Generators, Haulers, MRF Operators

Secondary Action Plans - plans not meeting priority objectives, deferred until the resources needed for implementation are available.

TABLE 1.4 : IN PROGRESS ACTION PLANS

ID NO.	ACTION PLAN	LEAD AGENCY	ORGANIZATIONAL LINKAGES
2.	Compile Catalogue of Plastics Environmental Information	EPIC	ASTM, APC, AMRC, RCO, PIA, PWMI-Europe & Japan, MOEE, Ministry of Education, Key Foundation, CPI, SPI, GIPPER
5.	Identify Issues, Barriers and Needs of Brand Owners	GPMC	WRO, RCO
7.	Evaluate Available Technologies for Tertiary Recycling	EPIC	APC, APME, CANMET, Universities
11.	Develop Plan for Diverting Residential Durables	AMRC	MOEE, EPIC, OMMRI, AMO, MRF Operators, Recyclers, RCO, Marketing Publications
16.	Define Market Development Needs (Residential)	OMMRI	EPIC, SPI, AMRC, OWMA, WRO, RCO, Recyclers
18.	Compile 2Rs Case Studies	WRO/AMRC	EPIC, PAC, NAPP, ESP, RCO, Industry Associations
19.	Enhance School Curriculum	EPIC/SPI	MOEE, Ministry of Education, Key Foundation, P.J. Spratt
23.	Disseminate Life Cycle Analysis Information	EPIC	APC, SETAC, PWMI, EPA, NAPP, MOEE
28.	Compile Inventory of Regulatory and Policy Issues	EPIC	WRO, RCO
29.	Evaluate Effectiveness of Voluntary/Mandatory Policy Tools	WRO/AMRC/EPIC	OMMRI, RCO, OWMA,

In Progress Action Plans - plans already initiated by one or more stakeholder groups.

TABLE 1.5 : TRACKING ACTION PLANS

ID NO.	ACTION PLAN	LEAD AGENCY	ORGANIZATIONAL LINKAGES
24.	Provide Quarterly advice to MOEE on Plastics Designation in the Ontario 3Rs Regulation	EPIC	WRO, RCO
25.	Develop a Mechanism to Track Impact of 3Rs Strategy	WRO	EPIC
26.	Develop a Mechanism to Track Plastics Use/Disposal	WRO	EPIC
27.	Evaluate Development of Residential Collection Programs	AMRC	EPIC, SPI, OWMA, AMO, WRO

·Tracking Action Plans - plans designed to monitor 3Rs progress.

APPENDIX A

ACRONYMS

ABS	acrylonitrile butadiene styrene
AMO	Association of Municipalities of Ontario
AMRC	Association of Municipal Recycling Coordinators
APC	American Plastics Council
APRA	Alberta Plastics Recycling Association
ASTM	The American Society for Testing and Materials
CARI	Canadian Association of Recycling Industries
CCAC	Consumer and Corporate Affairs Canada
CCGD	Canadian Council of Grocery Distributors
CCME	Canadian Council of Ministers of the Environment
CCPA	Canadian Chemical Producers' Association
CMA	Canadian Manufacturers Association
CPI	Canadian Plastics Institute
CPLA	Consumer Packaging and Labelling Act
CPRA	Canadian Polystyrene Recycling Association
CSA	Canadian Standards Association
CWME	Canadian Waste Materials Exchange
ECP	Environmental Choice Program
EFW	energy from waste
EPA	Environmental Protection Act, or Environmental Protection Agency (U.S.)
EPIC	Environment and Plastics Institute of Canada
EPS	expanded polystyrene
ESP	Environmentally Sound Packaging Coalition
GIPPER	Governments Incorporating Procurement Policies to Eliminate Refuse
GPMC	Grocery Products Manufacturers of Canada
GPP	government procurement policy
GPPS	general purpose polystyrene
HDPE	high density polyethylene
HIPS	high impact polystyrene
IC&I	industrial, commercial and institutional
ISTC	Industry, Science and Technology Canada
LCA	life cycle analysis
LDPE	low density polyethylene
LIPS	low impact polystyrene
LLDPE	linear low density polyethylene
MBS	Management Board Secretariat (formerly MGS)

MISA	Municipal-Industrial Strategy for Abatement
MEDT	Ministry of Economic Development and Trade (formerly MITT)
MGS	Ministry of Government Services (now MBS)
MITT	Ministry of Industry, Trade and Technology (now MEDT)
MOEE	Ministry of the Environment and Energy
MRF	material recovery facility
MSW	municipal solid waste
NAPP	National Packaging Protocol
NRC	National Research Council
OCMR	Ontario Centre for Materials Research
OETC	Ontario Environmental Training Consortium
OMMRI	Ontario Multi-Material Recycling Inc.
OPP	oriented polypropylene
OWE	Ontario Waste Exchange
OWMA	Ontario Waste Management Association
PAC	Packaging Association of Canada
PBD	polybutadiene
PC	polycarbonate
PCR	post-consumer resin
PET	polyethylene terephthalate
PFMAC	Plastics Film Manufacturers Association of Canada
PIA	Plastics Institute of America Inc.
PP	polypropylene
PPO	Pollution Prevention Office
PS	polystyrene
PUR	polyurethane
PVC	polyvinyl chloride
PWMI	Plastic Waste Management Institute
RCO	Recycling Council of Ontario
RDF	refuse-derived fuel
SAE	The Society of Automotive Engineers
SETAC	Society of Environmental Toxicology and Chemistry
SPI	Society of the Plastics Industry (of Canada)
STP	Plastics Strategy Team
3Rs	reduce, reuse and recycle
2Rs	reduce and reuse
WDIS	Waste Diversion Information System
WRAP	waste reduction action plan
WRO	Waste Reduction Office

APPENDIX B

ACTION PLANS

Background Information

1. Compile 3Rs Design Guidelines for Packaging
2. Compile Catalogue of Plastics Environmental Information
3. Implement Municipal Processing Cost Model
4. Communicate 3Rs Design Guidelines for Durables
5. Identify Issues, Barriers and Needs of Brand Owners
6. Characterize Plastic Materials Used for the Production of Durables
7. Evaluate Available Technologies for Tertiary Recycling

Diversion Initiatives

8. Select Key IC&I Resins for Immediate Diversion
9. Implement Plan for Diverting Key IC&I Resins
10. Develop Plan for Diverting Residential Non-durables
11. Develop Plan for Diverting Residential Durables
12. Gather and Diseminate 3Rs Design Standards for Durable Products

Market Development

13. Develop Immediate Marketing Initiatives for PCR
14. Develop Long-Term Marketing Initiatives for PCR
15. Develop a Procurement Strategy for PCR
16. Define Market Development Needs (Residential)
17. Evaluate Use of PCR in Non-Durables

Education & Communications

18. Compile 2Rs Case Studies
19. Enhance School Curriculum
20. Develop and Implement Training Programs
21. Develop an Integrated 3Rs Communications Strategy
22. Develop 3Rs Fact Sheets
23. Disseminate Life Cycle Analysis Information

Tracking & Monitoring

24. Provide Quarterly Advice to MOEE on Plastics Designation in the Ontario 3Rs Regulation
25. Develop a Mechanism to Track Impact of 3Rs Strategy
26. Develop a Mechanism to Track Plastics Use/Disposal
27. Evaluate Development of Residential Collection Programs

Regulatory & Nonregulatory Policies

28. Compile Inventory of Regulatory and Policy Issues
29. Evaluate Effectiveness of Voluntary/Mandatory Policy Tools
30. Evaluate Effectiveness of Labelling, Advertising and Coding
31. Evaluate Policy Instruments Needed to Divert IC&I Plastics Packaging

BACKGROUND INFORMATION

ACTION PLAN NO.1
(SECONDARY)

COMPILE 3RS DESIGN GUIDELINES FOR PACKAGING.

PURPOSE: The purpose of this action plan is to develop 3Rs design guidelines for plastics packaging and non-durable products. This information will be made available to parties who design and who specify their needs in relation to packages and non-durable products.

EXPECTED DURATION FROM START UP: 12 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Identify authors and assemble copies of existing guides.	GPMC	CSA
2.	Identify audience - package consultants, designers, specifiers and assessors in Canada.	GPMC	EPIC, PAC
3.	Evaluate the relationship between current packaging requirements (ie. regulations, policies, standards) and packaging design options that will minimize waste.	GPMC	EPIC, PAC, RCO
4.	Develop a harmonized design guide focused on plastic products.	GPMC	CSA, EPIC, PAC, MOEE
5.	Communicate design guidelines to target audiences (this may include training as well as communication needs).	GPMC	EPIC, PAC, MOEE

ACTION PLAN NO.2
(IN PROGRESS)

COMPILE CATALOGUE OF PLASTICS ENVIRONMENTAL INFORMATION.

PURPOSE: The purpose of this action plan is to develop a central reference for the plastics industry, its stakeholders and governments on matters related to the diversion of plastics from disposal.

EXPECTED DURATION FROM START UP: 4 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Compile a Glossary of Terms.	EPIC	ASTM
2.	Review Glossary to ensure its completeness and accuracy.	EPIC	APC, AMRC, RCO
2.a	Distribution.	EPIC	
3.	Compile a list of General References of materials available from EPIC, individual companies, American Plastics Council, Europe and Australia.	EPIC	APC, PIA, PWMI (Europe), PWMI (Japan)
3.a	Distribution.	EPIC	

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
4.	Compile a list of technical references (Global), providing a short description (summary) of contents for each list.	EPIC	APC, PIA, PWMI (Europe), PWMI (Japan)
4.a	Distribution.	EPIC	
5.	Assemble in-house material related to residential and IC&I waste diversion initiatives.	EPIC	
6.	Develop list of available newsletters/publications related to plastics and the environment as potential communications vehicles.	EPIC	
7.	Provide description of Education Package/training program currently available, including descriptions of each.	EPIC	MOEE, Ministry of Education, Key Foundation, CPI, SPI
8.	Catalogue current regulatory initiatives (Global).	EPIC	MOEE
9.	Develop Plastics Recycling Directory.	EPIC	MOEE
10.	Develop "Buy Recycled" guidelines manual.	EPIC	MOEE, GIPPER

ACTION PLAN NO.3
(PRIMARY)

IMPLEMENT MUNICIPAL PROCESSING COST MODEL.

PURPOSE: The purpose of this action plan is to outline the key steps necessary to develop and implement a municipal processing cost model that will enable recycling program managers to optimize processing techniques.

EXPECTED DURATION FROM START UP: **6 Months**

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Develop, generate or obtain data on plastic resin consumption and plastic waste generation.	EPIC/WRO	AMRC
2.	Determine the types and volumes of plastic available through the residential non-durable waste stream.	EPIC/WRO	AMRC
3.	Incorporate data on existing municipal programs which collect plastic products.	EPIC/WRO	OMMRI, AMO, AMRC
4.	Obtain, evaluate and combine - if possible - bale specifications which outline recyclers requirements.	EPIC/WRO	MRF Operators, Recyclers
5.	Determine existing markets and Free Market prices for baled plastic products.	EPIC/WRO	MRF Operators, Recyclers, Marketing Publications
6.	Assess applicability of the collection cost model and implement as appropriate.	EPIC/WRO	Municipalities

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
7.	Develop the framework for a processing cost model study.	(done)	
8.	Award the processing cost model study (7).	EPIC/WRO	
9.	Using data generated in steps 1, 2, 3, 5 define, develop and recommend a program to optimize diversion of marketable plastic products.	EPIC/WRO	OMMRI, AMO, AMRC
10.	Make the Municipal Processing Cost Model widely available to recycling program managers throughout Ontario.	EPIC	OMMRI, AMO, AMRC

ACTION PLAN NO.4
(SECONDARY)

COMMUNICATE 3RS DESIGN GUIDELINES FOR DURABLES.

PURPOSE: The purpose of this action plan is to identify the parties who design durable goods and to assemble and communicate existing 3Rs design guidelines to them.

EXPECTED DURATION FROM START UP: 6 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Clarify definition of durable/non durable.	EPIC	MOEE, CCME, etc.
2.	Gather information available on 3Rs design for durables.	EPIC	American Plastic Council , EPA, CMA, SAE, ASTM
3.	Identify Audience for Design Guides.	EPIC	CARI, CMA
4.	Develop and implement communication program.	EPIC	

ACTION PLAN NO.5
(IN PROGRESS)

IDENTIFY ISSUES, BARRIERS AND NEEDS OF BRAND OWNERS.

PURPOSE: The purpose of this action plan is to encourage brand owners to create demand for PCR by supporting innovative packaging design.

EXPECTED DURATION FROM START UP: 6 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Identify Brand Owners and other interest groups/companies to be interviewed.	GPMC	WRO, RCO
2.	Prepare information questionnaire - (interactive) to probe 3Rs opportunities in packaging.	GPMC	WRO, RCO
3.	Distribute information questionnaire.	GPMC	WRO
4.	Collect and analyze responses. Prepare report on findings.	GPMC	WRO, RCO
5.	General meeting with Brand Owners and other Interest Groups.	GPMC	WRO, RCO
6.	Prepare Summary Report identifying issues, barriers, needs, short term and long term opportunities.	GPMC	WRO, RCO
7.	Define course of actions and initiatives required to address the issues and concerns.	GPMC	WRO, RCO
8.	Develop projects to create new markets for PCR and take advantage of other 3Rs opportunities where appropriate.	GPMC	WRO, RCO

ACTION PLAN NO.6

CHARACTERIZE PLASTIC MATERIALS USED FOR THE PRODUCTION OF DURABLES.

(SECONDARY)

PURPOSE: The purpose of this action plan is to determine the type and quantity of plastics generated by the IC&I waste stream from the durable products.

EXPECTED DURATION FROM START UP: 12 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Determine existing resin consumption of durable products.	EPIC	SPI, AMRC, OWMA, Recyclers
2.	Examine existing sources of relevant data.	EPIC	SPI, AMRC, OWMA, Recyclers
3.	Determine the available supply of resins by sector, type and product.	EPIC	SPI, AMRC, OWMA, Recyclers
4.	Determine the existing and potential resin demand for major durable applications.	EPIC	SPI, AMRC, OWMA, WRO
5.	Integrate supply/demand projections.	EPIC	SPI, AMRC, OWMA, WRO
6.	Identify target applications for evaluations.	EPIC	SPI, AMRC, OWMA, WRO
7.	Target specific applications for diversion of plastics from disposal.	EPIC	SPI, AMRC, OWMA, WRO

ACTION PLAN NO.7
(IN PROGRESS)

EVALUATE AVAILABLE TECHNOLOGIES FOR TERTIARY RECYCLING.

PURPOSE: The purpose of this action plan is to evaluate tertiary recycling options in order to determine the state-of-the-art of these technologies and the potential contribution to further divert plastic products from disposal and help to conserve the material resource.

EXPECTED DURATION FROM START UP: 9 months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Track and monitor the progress of tertiary recycling programs in Canada, U.S.A., Europe and Japan.	EPIC	APC, APME, CANMET, Universities, etc.
2.	Determine the technical and economic feasibility of tertiary recycling of plastic products.	EPIC	APC, APME, CANMET, Universities, etc.
3.	Evaluate the infrastructure and other logistic requirements necessary to establish tertiary recycling.	EPIC	APC, APME, CANMET, Universities, etc.

DIVERSION INITIATIVES

ACTION PLAN NO.8
(PRIMARY)

SELECT KEY IC&I RESINS FOR IMMEDIATE DIVERSION.

PURPOSE: The purpose of this action plan is to select portions of the IC&I plastics waste stream which are amenable to immediate diversion and to establish a mechanism which will enable other segments of the plastics waste stream to be targeted in a timely manner.

EXPECTED DURATION FROM START UP: 3 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Establish criteria to determine products amenable to diversion (infrastructures exist to collect, recycle, markets available for reprocessed material).	EPIC	Generators, Haulers, Reprocessors, GPMC, CCGD, PFMA
2.	Identify major market segments to be reviewed against criteria of (1); Select possible targets.	EPIC	Generators, Haulers, Reprocessors, GPMC, CCGD, PFMA
3.	Using results of (2) identify and quantify possible opportunities. Select major targets. Review proposed model for implementation.	EPIC	Generators, Haulers, Reprocessors, GPMC, CCGD, PFMA

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
4.	Using analysis from (3) determine why some segments fail to meet criteria.	EPIC	Generators, Haulers, Reprocessors, GPMC, CCGD, PFMA
5.	Determine remedial program necessary to cause other sectors to meet criteria.	EPIC	Generators, Haulers, Reprocessors, GPMC, CCGD, PFMA
6.	Assess cost/benefit of remedial program on short and long term.	EPIC	Generators, Haulers, Reprocessors, GPMC, CCGD, PFMA
7.	Select particular segments for remedial action.	EPIC	Generators, Haulers, Reprocessors, GPMC, CCGD, PFMA
8.	Test result (7) through application of (3).	EPIC	Generators, Haulers, Reprocessors, GPMC, CCGD, PFMA

ACTION PLAN NO.9
(PRIMARY)

IMPLEMENT PLAN FOR DIVERTING KEY IC&I RESINS.

PURPOSE: In order to establish an effective IC&I Infrastructure and a clearly defined process to optimize diversion of large volume (BIG HITS) plastics resources from the waste stream, comprehensive plans must be developed and implemented.

EXPECTED DURATION FROM START UP: 12 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Establish Task Team.	EPIC	Generators, Haulers, Reprocessors, GPMC, CCGD, PFMA
2.	Develop the criteria that will enable the group to pinpoint existing fast track opportunities (i.e. Polystyrene) for the diversion of plastics from disposal.	EPIC	Generators, Haulers, Reprocessors, GPMC, CCGD, PFMA
3.	Develop and implement one or more plans as appropriate to focus on the "Big Hits" - eg. I.D. major volumes and sources, define method(s) of capture, I.D. markets, eg. education needs and key targets, education, collection/distribution, etc.	EPIC	Generators, Haulers, Reprocessors, GPMC, CCGD, PFMA

ACTION PLAN NO.10
(PRIMARY)

DEVELOP PLAN FOR DIVERTING RESIDENTIAL NON-DURABLES.

PURPOSE: To determine how best to implement the optimal (cost effective, efficient and sustainable) collection/processing programs to further expand plastics recycling in Ontario.

EXPECTED DURATION FROM START UP: 15 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Document existing residential plastic recycling initiatives (costs, tonnages, resin types, households served, etc.).	AMRC	MOEE, RCO, OMMRI, EPIC
2.	Establish criteria to be used in determining location (municipality) and timing for diversion (diversion targets already established).	AMRC	MOEE, RCO, OMMRI, EPIC
3.	Apply criteria to data #1 to identify short term opportunities (Phase 1).	AMRC	
4.	Develop short term (Phase 1) Action Plan, detailing product type, volumes, municipalities and timing.	AMRC	
5.	Evaluate Phase 1.	AMRC	MOEE, RCO, OMMRI, EPIC
6.	Develop Phase 2 Action Plan.	AMRC	

ACTION PLAN NO.11
(IN PROGRESS)

DEVELOP PLAN FOR DIVERTING RESIDENTIAL DURABLES.

PURPOSE: To develop a program to divert durable plastic products by type and volume from the residential waste stream.

EXPECTED DURATION FROM START UP: 9 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Develop a mandate and objectives and establish an ad hoc task team.	AMRC	
2.	Develop, generate or obtain data on durable products consumption and plastic waste generation.	AMRC	MOEE, EPIC, RCO
3.	Determine the types and volumes of plastic available through the residential durable waste stream.	AMRC	OMMRI, EPIC, RCO
4.	Determine and outline existing municipal programs which collect durable products containing plastic.	AMRC	OMMRI, MOEE, EPIC, RCO
5.	Obtain, evaluate and combine - if possible - bale specifications which outline recyclers requirements.	AMRC	MRF Operators, Recyclers, MOEE, EPIC, RCO

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
6.	Determine existing markets and Free Market prices for baled plastic products.	AMRC	MRF Operators, MOEE, Recyclers, Marketing Publications, EPIC, RCO
7.	Assess applicability of the collection cost model and implementation as appropriate.	AMRC	MOEE, EPIC
8.	Assess applicability of the processing cost model and implementation as appropriate.	AMRC	MOEE, EPIC
9.	Using data generated in steps 2,3,4 and 6 define, develop a program to optimize the diversion of durable plastic products.	AMRC	OMMRI, EPIC, AMO, RCO
10.	Develop a public education program to support 9 above.	AMRC	OMMRI, EPIC, AMO, MOEE, RCO

ACTION PLAN NO.12

GATHER AND DISSEMINATE 3RS DESIGN STANDARDS FOR DURABLE PRODUCTS.

(SECONDARY)

PURPOSE: The purpose of this action plan is to reduce the volume of durable goods and hence the associated plastics resins entering the waste stream by developing standards and policies that encourage industry to design for durability, reuse and recyclability. Initiatives by industry, Canadian Manufacturers Association (CMA) and their suppliers supported by Federal and Provincial Governments (Ministry of Economic Development and Trade, Ministry of Environment and Energy) will be expected to produce standards for use by manufacturers of durable goods.

EXPECTED DURATION FROM START UP: 6 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Identify and prioritize durables identified through long term monitoring of durable and plastic resins types found in the residential waste stream.	EPIC/MEDT	CARI, WRO, CMA
2.	Formation of industry specific durable task group identified in short term monitoring, to develop plan of action for each group based on needs assessment to accomplish long term elements of reduction.	EPIC/MEDT	CMA, CARI, AMRC, WRO, Federal and Provincial Governments
3.	Industry task groups develop policies and standards for their sector with industry developed goals, targets and standards done in cooperation with and supported by Federal and Provincial Governments.	EPIC/MEDT	CMA, CARI, AMRC, WRO, CSA, Federal and Provincial Governments

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
4.	Industry specific task groups with governments establish Memorandum of Understanding for the implementations of specific industry sector task group action plans/responsibilities in support of the plan.	EPIC/MEDT	CMA, CARI, AMRC, WRO, CSA, Federal and Provincial Governments

MARKET DEVELOPMENT

ACTION PLAN NO.13
(PRIMARY)

DEVELOP IMMEDIATE MARKETING INITIATIVES FOR PCR.

PURPOSE: The purpose of this action plan is to identify existing gaps between resin supplies and market demand in order to encourage the effective use of PCR.

EXPECTED DURATION FROM START UP: 9 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Estimate current and forecasted feedstock volumes, by resin group, from IC&I and residential collection and develop an immediate diversion program and recommendations.	EPIC/OMMRI	WRO, AMRC, Haulers
2.	Define existing markets for volumes estimated from #1 above. Identify gap.	EPIC/OMMRI	WRO
3.	Define current barriers (technical, policy, economic trade), and develop recommendations which could assist in narrowing the gap between resin supply and demand.	EPIC/OMMRI	WRO

ACTION PLAN NO.14
(PRIMARY)

DEVELOP LONG - TERM MARKETING INITIATIVES FOR PCR.

PURPOSE: The purpose of this action plan is to identify new market opportunities which will need to emerge to keep pace with the predicted growth in resin supplies derived from recycling programs in both the residential and IC&I sectors.

EXPECTED DURATION FROM START UP: 9 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Estimate long-term feedstock volumes, by resin group, which will result from diversion plans.	EPIC/OMMRI	WRO
2.	Identify long-term market gaps.	EPIC/OMMRI	WRO
3.	Using result of Step #2, define barriers and requirements which must be addressed to eliminate gaps. Develop quality and property requirements.	EPIC/OMMRI	WRO
4.	Develop recommendation for: i) expansion of PCR consumption ii) longer-term R&D programs iii) appropriate regulatory and/or incentive programs for public and private sector.	EPIC/OMMRI	GPMC, CCGD, WRO

ACTION PLAN NO.15
(PRIMARY)

DEVELOP A PROCUREMENT STRATEGY FOR PCR.

PURPOSE: The purpose of this action plan is to develop recommendations aimed at accelerating the development of procurement policies to further stimulate demand for PCR. Recommendations are targeted initially at governments but will also need to be expanded to the private sector.

EXPECTED DURATION FROM START UP: 9 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Commence case study, using one PCR as example, to illustrate how a government procurement policy (GPP) could stimulate demand for PCR's. Study to examine current scope of government procurement policy, inventory of existing and future market development opportunities, and recommend measures for stimulating PCR demand through government procurement policy.	MBS	GIPPER, MEDT, EPIC, AMO
2.	Inventory existing products made from PCR that are considered candidates for procurement.	MBS	EPIC, CPRA
3.	Review and approve short-term (priority) recommendations arising from Step 1 and additional GPP measures to be implemented.	MBS	EPIC, CPRA
4.	Develop Longer Term GPP initiatives (policy and product recommendations), as result of IC&I and Municipal Short Term Diversion Plans, and Market Development Plans.	MBS	EPIC, CPRA
5.	Implement procurement policies as appropriate.	MBS	EPIC, CPRA

ACTION PLAN NO.16
(IN PROGRESS)

DEFINE MARKET DEVELOPMENT NEEDS (RESIDENTIAL).

PURPOSE: The purpose of this action plan is to define the market development needs for PCR derived from the residential waste stream. Market development needs could include such things as new opportunities and products and/or specifically targeted research and development.

EXPECTED DURATION FROM START UP: 9 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Determine existing resin consumption.	OMMRI	EPIC, SPI, AMRC, OWMA, RCO, Recyclers
2.	Examine existing sources of data on plastic wastes.	OMMRI	EPIC, SPI, AMRC, OWMA, RCO, Recyclers
3.	Determine supply of wastes by sector, type and product.	OMMRI	EPIC, SPI, AMRC, OWMA, RCO, Recyclers
4.	Determine demand, existing and potential by application.	OMMRI	EPIC, SPI, AMRC, OWMA, WRO, RCO
5.	Integrate supply/demand projections.	OMMRI	EPIC, SPI, AMRC, OWMA, WRO, RCO
6.	Identify market development need.	OMMRI	EPIC, SPI, AMRC, OWMA, WRO, RCO
7.	Identify target applications for diversion and integration with the market action plan.	OMMRI	EPIC, SPI, AMRC, OWMA, WRO, RCO

ACTION PLAN NO.17
(SECONDARY)

EVALUATE USE OF PCR IN NON-DURABLES.

PURPOSE: The purpose of this action plan is to evaluate the optimum use of recycled content in non-durable applications as a means to increase the use of PCR.

EXPECTED DURATION FROM START UP: 6 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Evaluate regulatory instruments: ◆ Regulated content ◆ Government procurement policies	GPMC	RCO, AMRC, PAC
2.	Compare with non-regulatory tools: ◆ Policies ◆ Buying guides ◆ Economic factors	GPMC	RCO, AMRC, PAC
3.	Evaluate the technical limitations in the utilization of recycled content: ◆ Primary resin producers ◆ Converters ◆ Brand Owners ◆ Retailer/Distributor ◆ Consumer	GPMC	RCO, AMRC, PAC
4.	Determine how best to optimize recycled content (cost/benefit analysis) in non-durable applications.	GPMC	RCO, AMRC, PAC

EDUCATION AND COMMUNICATIONS

ACTION PLAN NO.18
(IN PROGRESS)

COMPILE 2RS CASE STUDIES.

PURPOSE:

The purpose of this action plan is to assemble 2Rs (reduction and reuse) case studies on plastics diversion. Case studies will be aimed at two prime audiences:

1) industry in order to enhance awareness and encourage change.
2) the general public and governments as example illustrations of model achievements.

EXPECTED DURATION FROM START UP:

12 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Inventory case studies (include criteria used in assessing improvement).	WRO/AMRC	EPIC, PAC, NAPP, ESP, RCO, Industry Associations
2.	Establish criteria for identifying success stories and determine boundaries of criteria.	WRO/AMRC	
3.	Select case studies for individual categories. Prepare for distribution using plastics 2Rs criteria.	WRO/AMRC	
4.	Prepare preamble on how others could use sample case studies.	WRO/AMRC	
5.	Develop and implement communication plan.	WRO/AMRC	EPIC, RCO, Industry Associations
6.	Update and disseminate 2Rs case studies on an ongoing basis.	WRO/AMRC	

ACTION PLAN NO.19
(IN PROGRESS)

ENHANCE SCHOOL CURRICULUM.

PURPOSE: The purpose of this action plan is to up-grade current educational materials which pertain to plastics and the environment, and offer Ontario teachers wide-spread access to enhanced school curriculum.

EXPECTED DURATION FROM START UP: Ongoing

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Obtain and examine the P.J. Spratt program, developed for Grades 7-10 to determine suitability and impact potential for this environmental initiative.	EPIC/SPI	MOEE, Ministry of Education, Key Foundation
2.	Ensure that the program is supportive of the Ministry of Education curriculum guidelines.	EPIC/SPI	MOEE, Ministry of Education
3.	Enhance developed program, as necessary.	EPIC/SPI	MOEE, Ministry of Education, P.J.Spratt
4.	Vet Enhancements.	EPIC/SPI	MOEE, Ministry of Education
5.	Deliver materials to Boards of Education or appropriate organization.	Ministry of Education	SPI, MOEE
6.	Develop a feedback mechanism and monitor the program's impact or need for revision.	EPIC/SPI	Ministry of Education, MOEE, P.J. Spratt

ACTION PLAN NO.20 (SECONDARY)

DEVELOP AND IMPLEMENT TRAINING PROGRAMS.

PURPOSE: The purpose of this action plan is to satisfy general training requirements for plastics diversion initiatives.

EXPECTED DURATION FROM START UP: 15 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Review and categorize the training programs currently offered - request other organizations to identify currently available training programs.	EPIC	OETC, SPI
2.	Prioritize the groups that will require training. These groups can potentially be any that will have to deal with plastics diversion programs.	EPIC	AMRC, RCO (Operators Committee)
3.	Identify the training needs - conduct surveys/needs assessments.	EPIC/CPI	AMRC, RCO, SPI, Consumers Association of Canada
4.	Develop new training programs for key client groups and sponsors as required and update existing programs where appropriate.	EPIC/CPI	OETC, SPI, MOEE

ACTION PLAN NO.21
(PRIMARY)

DEVELOP AN INTEGRATED 3RS COMMUNICATIONS STRATEGY.

PURPOSE: The purpose of this action plan is to provide a consistent approach for the development and dissemination of communication products related to the 3Rs.

EXPECTED DURATION FROM START UP: 9 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Prioritize the issues to be addressed/messages to be conveyed.	EPIC	AMRC, WRO
2.	Evaluate the suitability of employing existing communications vehicles and/or the need to establish new ones.	EPIC	AMRC, RCO, WRO
3.	Assemble list of target audiences, ensuring that appropriate messages are conveyed on a focused basis.	EPIC	AMRC, WRO
4.	Develop information products and implement programs.	EPIC	AMRC, WRO
5.	Determine the balance required within each medium to deliver messages (print, electronic, media, personal contact, etc.).	EPIC	AMRC, WRO
6.	Establish monitoring/feedback mechanism to assess "acceptability" of delivered communications products/messages.	EPIC	AMRC, WRO

ACTION PLAN NO.22
(SECONDARY)

DEVELOP 3RS FACT SHEETS.

PURPOSE: The purpose of this action plan is to outline the process required for developing Fact Sheets that will provide target audiences with practical advice on diverting plastics from disposal.

EXPECTED DURATION FROM START UP: 9 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Identify target audiences: • Plastic industry • IC&I sector • Industry associations • Municipalities • Public	EPIC/AMRC	RCO, MOEE
2.	Assemble, write and distribute material through existing communication vehicles.	EPIC	AMRC, MOEE
3.	Determine need for additional distribution vehicles such as Ontario Community newspapers, corporate/industry newsletters and trade/consumer publications.	EPIC	AMRC, MOEE
4.	Monitor quantitative/qualitative feedback on usefulness of material provided.	EPIC/AMRC	MOEE

ACTION PLAN NO.23
(IN PROGRESS)

DISSEMINATE LIFE CYCLE ANALYSIS INFORMATION.

PURPOSE: The purpose of this action plan is to ensure all stakeholders are up to date on state of the art LIFE CYCLE ANALYSIS (LCA).

EXPECTED DURATION FROM START UP: 24 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Develop clear objectives and establish an ad hoc task team.	EPIC	APC, SETAC, PWMI, EPA, NAPP
2.	Identify current state of the art LCA.	EPIC	APC, SETAC, PWMI, EPA, NAPP
3.	Develop an education/information "package" and advisory program.	EPIC	
4.	Foster widespread awareness of LCA by implementing an advisory program to targeted audiences.	EPIC	MOEE, NAPP, APC

TRACKING AND MONITORING

ACTION PLAN NO.24

PROVIDE QUARTERLY ADVICE TO MOEE ON PLASTICS DESIGNATION IN THE ONTARIO 3RS REGULATION.

(TRACKING)

PURPOSE: The purpose of this action plan is to provide on-going advice to the Provincial Government regarding the optimum approach to updating the source separation requirement for plastics.

EXPECTED DURATION FROM START UP: Ongoing

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Estimate market potential and propose criteria to indicate when a product is ready for designation.	EPIC	
2.	Assess major plastic components of waste stream in comparison with the proposed criteria.	EPIC	WRO, RCO
3.	Inform MOEE of products meeting criteria.	EPIC	WRO
4.	Document the areas where particular products do and do not meet criteria.	EPIC	WRO
5.	Convey quarterly advice to MOEE on designation of plastic products in 3Rs regulation.	EPIC	

ACTION PLAN NO.27
(TRACKING)

EVALUATE DEVELOPMENT OF RESIDENTIAL COLLECTION PROGRAMS.

PURPOSE: The purpose of this action plan is to evaluate the efficiency and effectiveness of existing collection programs and the associated infrastructure in order to optimize recycling program design in the future.

EXPECTED DURATION FROM START UP: Ongoing

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Identify all factors inhibiting the further development of residential collection programs.	AMRC	EPIC, SPI, OWMA, AMO
2.	Evaluate the relative impact of collection program design features (ie. key strengths and weaknesses) on the diversion of plastics from disposal.	AMRC	EPIC, SPI, OWMA, AMO
3.	Recommend modifications to the design of collection programs where appropriate.	AMRC	EPIC, SPI, WRO

REGULATORY AND NONREGULATORY POLICIES

ACTION PLAN NO.28
(IN PROGRESS)

COMPILE INVENTORY OF REGULATORY AND POLICY ISSUES.

PURPOSE: The purpose of this action plan is to develop an inventory of regulatory and policy issues related to the diversion of plastics from disposal.

EXPECTED DURATION FROM START UP: 6 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Draft preliminary list of issues/policy tools.	EPIC	WRO, RCO
2.	List allocated to specific task groups for consideration and feedback.	EPIC	WRO, RCO
3.	Document a comprehensive regulatory/policy inventory for access by interested parties.	EPIC	WRO, RCO

ACTION PLAN NO.29
(IN PROGRESS)

EVALUATE EFFECTIVENESS OF VOLUNTARY / MANDATORY POLICY TOOLS.

PURPOSE: The purpose of this action plan is to assess the relative diversion effectiveness of implementing voluntary programs versus mandatory legislative and/or policy requirements. The plan will focus upon waste stream impacts attributable to a wide variety of policy tools in use and the relevant experience derived within and outside of Ontario.

EXPECTED DURATION FROM START UP: 21 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
	Residential Sources		
1.	Evaluate the impact of mandatory measures already implemented: ◆ Mandatory curbside recycling participation through local by-law ◆ Local user pay initiatives ◆ Deposits	WRO/AMRC	OMMRI, RCO
2.	Evaluate the impact of voluntary programs.	WRO/AMRC	
3.	Estimate the impacts (ie.: diversion) of mandatory requirements in comparison to voluntary programs	WRO/AMRC	OMMRI, RCO

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
	IC&I Sources.		
4.	Evaluate the impact of mandatory measures. ♦ Designated source separation ♦ Local landfill bans ♦ Tipping fee surcharge	WRO/EPIC	OWMA, AMRC
5.	Evaluate the impact of voluntary programs on the waste stream (ie. case studies)	WRO/EPIC	RCO
6.	Estimate the impacts (ie. diversion) of mandatory requirements in comparison to voluntary programs.	WRO/EPIC	

ACTION PLAN NO.30
(SECONDARY)

EVALUATE EFFECTIVENESS OF LABELLING, ADVERTISING, AND CODING.

PURPOSE: The purpose of this action plan is to review the use of key plastic product information such as environmental symbols, product advertising, labelling, SPI and other codes in order to ensure that this information is applied appropriately and that it becomes widely understood.

EXPECTED DURATION FROM START UP: 6 Months

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Assemble current information on plastic product labelling, advertising and coding.	EPIC	Consumer and Corporate Affairs, RCO
2.	Evaluate the impact of labelling, advertising and coding on the diversion of plastics from disposal.	EPIC	MOEE, Consumer and Corporate Affairs, RCO
3.	Recommend where appropriate, improvements to labelling, advertising and coding.	EPIC	Consumer and Corporate Affairs, RCO

ACTION PLAN NO.31

EVALUATE POLICY INSTRUMENTS NEEDED TO DIVERT IC&I PLASTICS PACKAGING.

(SECONDARY)

PURPOSE: The purpose of this action plan is to assess opportunities for diverting IC&I packaging.

EXPECTED DURATION FROM START UP: Ongoing

STEP NO.	KEY STEPS	SUGGESTED LEAD AGENCY	PROGRAM/ ORGANIZATIONAL LINKAGES
1.	Using the inventory of regulatory and policy needs matrix assess the appropriate action required to facilitate the diversion plan.	EPIC	Generators, Haulers
2.	Assess the applicability of the MRF processing cost model developed by the MOEE, the Municipal Task Group and EPIC to the diversion of IC&I plastic products.	EPIC	Generators, Haulers
3.	Implement applicable section as appropriate.	EPIC	MRF Operators, Generators, Haulers
4.	Re-examine the market segments developed through action plans No.7 & No.8.	EPIC	MRF Operators, Haulers, Generators

APPENDIX C

GLOSSARY

Automatic Separation
Innovative sorting technology is being developed and refined to separate mixed plastic waste streams by colour and/or major resin type, as well as remove non-plastic contaminants. Several automatic systems are now offered commercially.

Blue Box
More than 3 million Ontario households have been supplied with distinctive curbside collection containers made of plastic (blue or green collection boxes or blue bags may be employed). The types of solid wastes being collected vary among municipalities and may include glass jars and bottles, aluminum and other cans, newsprint and cardboard, PET bottles, rigid plastic bottles, plastic film and polystyrene.

Coding
In the context of waste management for non-durable products, coding refers to a system used to identify recyclable materials. The resins used in plastic packaging may be identified by a three-sided arrow symbol, which surrounds a number from one to seven and incorporates specific code letters. A more complex system exists for durable products.

Collection
The act of picking up materials at home, businesses or industrial sites and hauling them to a recycling facility, energy recovery plant or a landfill.

Commingled Plastics
A mixture of two or more different types of plastic materials. Technology now exists to recycle commingled plastics into useful products.

Contaminant
Foreign materials (such as dirt, organic waste, oil or the residues of the contents of plastic containers) that make it more difficult to recycle a plastic feedstock or reduce the value of the derived post-consumer resin.

Degradable Plastics
Plastics specifically developed or formulated to break down after exposure to sunlight or microbes.

Disposable
See Non-durable.

Disposal Facility

A facility or part of a facility where waste is intentionally placed, and at which waste will remain after closure. Landfills, landfarms or lakefills are all examples of disposal facilities.

Diversion

Using the 3Rs of waste management as part of a strategy to keep materials from going to disposal.

Durables

Durable products are designed for extended use or reuse, with a useful life of at least three years (according to ASTM definition). Major appliances and electronics, auto parts and tires, piping and building materials, furniture and housewares, and reusable totes and pails are all classified as durables.

Environment

The most comprehensive definition of "environment" is contained in the Ontario Environmental Assessment Act: "(i) air, land or water; (ii) plant and animal life, including man; (iii) the social, economic and cultural conditions that influence the life of man or a community; (iv) any building, structure, machine or other device or thing made by man; (v) any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from the activities of man; or (vi) any part or combination of the foregoing and the interrelationships between any two or more of them, in or of Ontario."

IC&I Solid Waste

Industrial, Commercial and Institutional solid wastes generated by businesses and industries (including factories, construction and demolition projects, shopping centres, restaurants and offices) and institutions (such as schools, hospitals and government offices). IC&I wastes comprise approximately 60% of Ontario's total municipal solid waste stream.

Incineration

The thermal destruction of organic waste in a controlled manner, producing ash, slag, gases and, usually, slurry from the air pollution control system.

Integrated Waste Management

The complementary use of a variety of waste management practices to safely and effectively handle municipal solid waste. Integrated waste management techniques include source reduction, recycling, and combustion and landfilling.

Landfill

A facility for the burial/disposal of solid, nonhazardous wastes under controlled conditions with the objective of minimizing environmental impacts or hazards to public health and safety.

Level Playing Field
Environmental policies and programs are said to support a "level playing field" when they are designed: to apply equally to all suppliers to the Ontario market (including those in other provinces and countries); to be equitable and not favour one material sector over another; so that the established infrastructure is controlled equitably and does not exclude other competitors (i.e. collection and processing are available to all parties on a common basis); and to ensure that alternatives are more onerous than joining industry programs.

Life Cycle Analysis (LCA)
A quantifiable assessment of the environmental impacts of a product/process through the stages of its life, including: the extraction of the raw materials used in its manufacture; the water, energy, and process chemicals used and the wastes produced during processing; transportation, handling, packaging and marketing; use of the product; and final recycling, treatment or disposal of residues.

Manual Separation
Hand sorting is widely used (at the point of generation or material recycling facility) to separate plastic wastes by resin and/or colour. Automatic sorting systems under development offer advantages in speed, efficiency and operating costs.

Material Recovery Facility (MRF)
A recycling site that receives mixed recyclables or source-separated materials such as newsprint, fine paper, old corrugated containers, glass, ferrous, aluminum, PET and other plastics, wood, concrete and brick, and drywall. The MRF can: physically remove contaminants, sort, grade, bale, grind, package and transfer the material to a recycler or end-user.

Monomers
The basic chemical building blocks used to create plastic polymers (long chain molecules).

Municipal Solid Waste (MSW)
Materials discarded by individuals in the course of their daily activities at home and by commercial businesses, industries and institutions as a result of normal operating activities. MSW is usually subdivided into Residential Waste and IC&I Solid Waste. MSW does not include hazardous or liquid industrial wastes.

Non-durable
A consumer product designed to be used either once or a limited number of times (with a useful life of less than three years, according to ASTM) before disposal or recycling. Non-durables include many forms of packaging and certain convenience items.

Off-Grade Resin
Any resin that does not meet its manufacturer's specifications, but may still be offered for sale.

Ontario Regulation 347

Waste Management — General Regulation 347, under Ontario's Environmental Protection Act, sets out standards for solid waste disposal sites and waste management systems, and governs the handling, transport and disposal of registerable liquid industrial and hazardous wastes.

Packaging

A material or item that is used to protect, contain or transport a commodity or product or that is physically attached to a product or its container for the purpose of marketing the product or communicating information about the product.

Plastics

Synthetic materials consisting of large polymer molecules derived from natural gas, petrochemicals or liquid hydrocarbons. Plastics are capable of being shaped or molded under the influence of heat, pressure or chemical catalysts. Polymer resins are often combined with other ingredients, including colourants, fillers, reinforcing agents and plasticizers, to form plastic products.

Polymer

A very long chain molecule made up of smaller units, known as monomers, strongly bonded together.

Post-Consumer Resin (PCR)

PCR is manufactured from used plastic materials or products, generated by consumers in homes, offices, retail outlets, and institutions, which have served their intended purpose and been diverted from the waste stream and recycled. PCR is distinct from Post-Industrial Scrap.

Post-Industrial Scrap

Plastic scrap, trim, shavings, grindings, runners, sprues and damaged materials generated by a processor or fabricator. May consist of a single material or a blend of materials. Typically reground on-site and reused directly in the process that generated them, but may be ground and/or extruded into pellets (then called reprocessed or "repo" plastic) for sale to, or use by, another party. Also known as Pre-Consumer Resin (but should not be mistaken for Post-Consumer Resin or PCR).

Primary Recycling

Relatively clean and segregated post-use plastics are processed into new products with properties similar to those of the original resin.

Quaternary Recycling

The energy content of plastics is recovered by using them as fuel in an energy-from-waste facility.

Recyclable

According to draft labelling guidelines developed by Consumer and Corporate Affairs Canada, a product or package is deemed "recyclable" where at least one-third of the population in the market where the product is sold has convenient access to collection or drop-off facilities for recycling that material. Where a material or product cannot be or is not reasonably expected to be recycled, no claim of recyclability may be made.

Recycled Content

According to draft labelling guidelines developed by Consumer and Corporate Affairs Canada, manufacturers must indicate the percentage (by weight) of recycled material contained in a product or package in all cases where claims of recycled content are made. Unless otherwise stated, it is assumed the recycled component is derived from post-consumer materials.

Recycling

Physical, chemical or biological processes are used to transform a waste stream and separate or extract useful materials to replace some or all of the virgin materials needed to make a new product. To be successful, recycling program requires an effective infrastructure for segregating, collecting, transporting and reprocessing the feedstock, as well as the maintenance of stable markets for the derived secondary materials.

Reduction

Reduction involves activities which decrease or eliminate the generation of waste. Industrial production changes or modified consumer practices can decrease the consumption of materials and/or the quantity of waste produced.

Reprocessed Plastic

See Post-Industrial Scrap.

Residential Solid Waste

The waste produced by all kinds of households, including detached dwellings, row housing, condominiums and apartments. In Ontario, residential waste makes up about 40% of the total Municipal Solid Waste (MSW) stream.

Resin

A synthetic polymer. The term "resin" commonly refers to the basic polymer material which, together with modifiers and other additives, is used to fabricate a plastic product.

Resource Recovery

Any process that extracts value from collected solid wastes (for example, through recycling, or burning wastes as fuel to generate energy).

Reuse
To use a product or package again, in its original form, for either the same or a different purpose. Reuse entails less intensive cleaning/reprocessing than is usually involved in recycling.

Secondary Recycling
Turns mixed or contaminated plastic scrap into new materials with properties that differ from those of the original plastic products.

Separation
Division of wastes into groups of similar materials (either mechanically or manually). Potentially recyclable plastic packaging has been coded to support the separation process.

Solid Waste
See Municipal Solid Waste.

Solid Waste Management
The entire process of collecting, sorting, processing, recycling, reclaiming, treating and disposing of waste. The recommended waste management hierarchy begins with consideration of practicable waste reduction and reuse measures, followed by recycling and resource recovery, and finally disposal.

Source Reduction
The design, manufacture and use of products so as to reduce their amount and toxicity. Source reduction measures include reusing items, minimizing the amount of products used, extending the useful life of a product, and reducing the amount of excessive product packaging.

Source Separation
The segregation of used materials from municipal waste into specific material categories at the point of generation in order to facilitate recycling.

Tertiary Recycling
Commingled or single resin plastic scrap is broken down into its basic monomers or hydrocarbon constituents, which can then be used as a fuel, chemical feedstocks or a raw material to make new resins.

Thermoplastics
Plastics that can be repeatedly softened by heating, shaped by flow into articles by molding or extrusion, and hardened.

Thermosets
These resins are hardened or "cured" by an irreversible chemical reaction which creates strong cross-links between the polymer molecules. Once formed, thermosets cannot be remelted

without degrading the resin.

Three Rs (3Rs)
The reduction, reuse and recycling of post-use materials. Sometimes the term "2Rs" is used to refer specifically to reduction and reuse activities.

Tipping Fee
The amount of money charged by the operator of a transfer station or an approved waste disposal facility for receiving and managing waste. The charge may be based on either the weight, origin, type or volume of the waste. Tipping fees vary widely among individual municipalities.

Transfer Station
Facility used to receive, (in some cases) sort, and temporarily store wastes and/or recyclable materials until they are shipped to another site for reprocessing or disposal.

True Cost Accounting
An accounting practice that involves recording all the costs — including the environmental and social costs — of managing the wastes generated from the use of a particular product or package. This could include, for example, energy use, transport, treatment, handling, and disposal costs (including landfill siting, operation and closure expenses). Related to "full cost accounting." The principles and methodologies of true cost and full cost accounting are currently being refined.

Virgin Materials
Any raw material intended for industrial processing which has not been previously used.

Waste
According to the Environmental Protection Act, "waste" includes "ashes, garbage, refuse, domestic waste, industrial waste, or municipal refuse and other such wastes as are designated in the regulations."

Waste Reduction Workplan
According to pending regulations under the Environmental Protection Act, a "waste reduction workplan" is defined as an "organized plan of work that when implemented will maximize waste diversion from disposal including a description of specific activities, timelines, responsible parties, and expected results."

Definitions are taken, in part, from: "Solid Waste Management: A Glossary of Terms," Ontario Ministry of Environment, Public Information Centre, Winter, 1992; and "Glossary of Terms," Environmental and Plastics Institute of Canada, October, 1991.

APPENDIX D

TERMS OF REFERENCE

Ontario Ministry of the Environment
Waste Reduction Office
Plastics Strategy Team

Proposed Terms of Reference
May 1992

The Ministry of the Environment's drive towards waste diversion through the 3Rs (reduction, reuse and recycling) is part of the larger objective of changing our consumer society into one that conserves.

In March 1991, the ministry created the Waste Reduction Office to focus attention on waste diversion and to ensure the province meets its waste reduction targets of at least 25 per cent by the end of 1992 and 50 per cent by the year 2000.

The government cannot achieve this goal alone. Thus, multi-stakeholder strategy teams are being created to prepare 3Rs plans. This is to ensure that those who are affected by the shift to a conserver society, have an opportunity to contribute to Ontario's long-term waste management policies.

Other strategy teams that are being created will focus on the following areas:

- materials that can be composted (wet materials);
- paper fibres;
- scrap tires;
- municipal 3Rs infrastructure;
- construction and demolition materials; and
- sewage sludge.

Objectives

Plastic from packaging and other consumer products, represents 10 per cent (by weight) of the waste from residential, industrial, commercial and institutional sectors. Thus, one objective of the team, will be to develop a strategy to decrease the amount of plastics disposed in landfills. Initiatives that are now being implemented by the plastics industry will also be considered.

The value of producing packaging, durable products and plastic resins, far exceeds waste management costs. These costs are not normally included in the cost of production. Thus, another objective will be to determine this cost and who should share in it.

A third objective will be to identify market development and waste reduction opportunities.

Role of the team

The team will discuss the full range of 3Rs options and the best means of achieving a significant diversion of plastics from disposal*.

The team will also consider:

- market development initiatives for post-consumer plastics;
- new product designs to enhance waste reduction;
- options for prolonging the durability of plastics applications;
- opportunities for expanding the municipal Blue Box program to include all plastics;
- joint plans to divert plastics from the industrial, commercial and institutional (IC&I) sectors;
- levels of recycled content requirements in existing and new products;
- working with the National Task Force on Packaging;
- communications programs to support diversion and uses of post-consumer plastics; and
- the establishment of an integrated waste management system that includes waste reduction and landfill.

The plastics team will be asked to address long-term objectives and to develop action plans. The group will be kept informed about related activities, such as: issues about the Greater Toronto Area and the ongoing implementation of the ministry's Waste Reduction Action Plan.

List of potential stakeholders

All participants (see Appendix A - List of stakeholders) will be invited to participate on the main steering group. The steering group will meet at least once every three months.

A variety of working groups may also be established to address specific issues such as: procurement policy development, promotion of end-use markets for post-consumer plastics, etc. The groups will report to the main steering group and will be asked to complete specific tasks. The working groups will meet as frequently as necessary to satisfy their objectives.

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* The plastics team will concentrate on the 3Rs of waste management. The 3Rs hierarchy will be observed when various options are considered to divert plastics from disposal. For the purpose of discussion, the following definitions will apply:

Reduction is defined as those activities which decrease or eliminate the generation of waste.
Reuse is defined as using an item again in its same form, for the same or a different purpose.
Recycling is defined as the separation or extraction of useful materials from the waste stream to provide materials for the production of new products.

APPENDIX E

GROUP AND AGENCY PARTICIPANTS ON THE PLASTICS STRATEGY TEAM

Representatives from the following companies, associations, organizations, municipalities or government agencies participated in the deliberations of the Plastics Strategy Team or its Task Forces. (Note, a representative may have attended on behalf of more than one organization.) Participation does not, necessarily, connote agreement with any or all of the findings, proposals or recommendations of the Plastics Strategy Team.

PLASTICS INDUSTRY

Manufacturers of Primary Resins

AT Plastics Inc.
Dow Chemical Canada Inc.
DuPont Canada Inc.
Eastman Chemicals Canada Inc.
Imperial Oil
Monsanto Plastics
Novacor Chemicals (Canada) Ltd.
Shell Canada Chemical Corp.

Plastic Product Converters

ABC Group
AT Plastics Inc.
DuPont Canada Inc.
First Brands (Canada) Corp.
Lawson Mardon Flexible Packaging
Polytainers Inc.

END USERS OF PLASTICS PRODUCTS AND PACKAGING

Brandowners

Ault Foods Limited
First Brands (Canada) Corp.
Lever Brothers Ltd.
Shoppers Drug Mart

Retailers

Sears Canada Inc.
Shoppers Drug Mart

PLASTIC RECYCLERS

Municipal Sector

City of Brampton
Metropolitan Toronto
Quinte & South Hastings Waste Mgt.
Regional Municipality of Peel
Regional Municipality of Waterloo
Regional Municipality of York

Waste Haulers

Laidlaw Waste Systems Ltd.

Material Recycling Facilities — Sortation

Bronte 3Rs
HGC Management Inc.
Laidlaw Waste Systems Ltd.
Scott's Plains Recycling Inc.

Private Sector — Processing

Canadian Polystyrene Recycling Association
Resource Plastics Inc.

ASSOCIATIONS

Association of Municipal Recycling Coordinators
Environment and Plastics Institute of Canada
Grocery Products Manufacturers of Canada
Ontario Multi-Material Recycling Inc.
Ontario Waste Management Association
Retail Council of Canada

INTEREST GROUPS

Canadian Union of Public Employees
Ontario Centre for Materials Research
Ontario Environment Network

PROVINCIAL GOVERNMENT

Ministry of Economic Development and Trade
Ministry of Environment and Energy

APPENDIX F

PLASTICS IN ONTARIO: THEIR PRODUCTION, USE AND DIVERSION FROM DISPOSAL

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A NOTE ON THE DATA

Comprehensive data documenting the current production, use and disposal of plastic resins in Ontario have not been published. The figures and statistical analyses presented in this report are based on the best information available. Estimates are conservative and considered to be valid in accordance with the knowledge and experience of the members of the Plastics Strategy Team. It is believed this report presents an accurate picture of the waste management activities of the plastics industry in Ontario.

APPENDIX F

PLASTICS IN ONTARIO: THEIR PRODUCTION, USE AND DIVERSION FROM DISPOSAL

WHAT ARE PLASTICS?

Plastics are one of the most versatile and important materials ever invented by man. Developed in the 1860s — as a substitute for the ivory that was used to make piano keys and billiard balls — plastic usage has grown and expanded to touch almost every aspect of modern life.

Today there are more than 40 families of plastic resins, each with its unique properties and uses. Hundreds of additives — stabilizers, curatives, fillers, reinforcers, colourants and plasticizers — can be added to make thousands of plastic products.

The packaging, construction and automotive industries are the three largest users of plastics in Canada, consuming about three-quarters of the resins used each year. Other major markets include furniture makers, electronics, housewares and the health care industry.

Almost all plastics are made from raw materials derived from oil and gas feedstocks. For example, the ethylene molecule — the basic building block used to make polyethylene plastic resins — is derived from natural gas, petroleum refinery gases or liquid hydrocarbons. While other feedstocks, including coal, castor oil and other agricultural oils, may be used, petrochemicals are still the most popular, readily available and economical source of raw materials for plastics today.

However, plastic production does not constitute a significant drain on our country's petroleum resources. Only about two percent of Canada's oil and gas production goes to manufacture all the plastics produced each year in this country.

Plastic producers use the petrochemical monomers to manufacture a whole range of resins through a process known as polymerization. The single monomer molecules are linked together in long chains to form very large organic molecules known as polymers (a term derived from the Greek words for "many parts"). These plastic polymers are then sold in the form of granules, powders, pellets, flakes or liquids for processing into intermediate or finished products.

When heated, the resin becomes fluid and can be forced though a die or orifice to shape it into a uniform shape — a tube, sheet or some other form — a process known as extrusion.

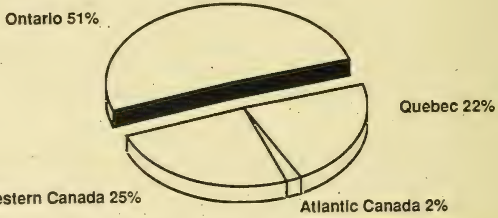
Granular or powdered resins can also be softened and forced, under high pressure, through a nozzle into a mold, where they harden to take the shape of the mold. This is called injection molding, and used to make toys, fixtures, auto parts and thousands of other products.

Plastic resins generally fall into one of two groups — thermoplastics or thermosets — depending on the properties they exhibit when they are processed into products.

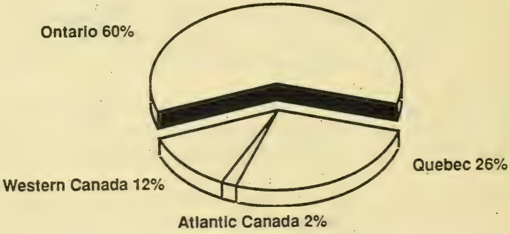
Tables F.1 & F.2

THE CANADIAN PLASTICS INDUSTRY

Number of Facilities



Number of Employees



(Based on data supplied by the Society for the Plastics Industry (SPI).)

Society for the Plastics Industry in Canada

With more than 400 members, SPI is considered the voice of the plastic industry. SPI works with government agencies on developing codes, marketing programs and environmental policies that support the health and growth of the industry in Canada, as well as its international competitiveness.

Environment & Plastics Institute of Canada

EPIC is committed to developing realistic and scientifically sound programs to promote the environmentally responsible use of plastics. As part of its recycling education efforts, EPIC publishes fact sheets, newsletters and the handbook, "How to Implement a Plastics Recycling Program."

Canadian Plastics Institute

CPI takes the lead in collecting, evaluating and disseminating plastics technical information and expertise in Canada. Funded by SPI, ISTC and NRC, the institute provides seminars, technical bulletins and multi-client studies.

THE ONTARIO PLASTICS INDUSTRY

Across Canada, there are more than two thousand companies active in the plastics industry — from resin producers to processors and fabricators to recyclers. With $7 billion in annual revenues, Ontario's plastics companies account for more than 60% of the Canadian plastic industry's business. The overwhelming majority of these firms are small or medium-sized. Only 11% of them have workforces that exceed one hundred employees. Forty percent of the companies employ ten or fewer workers.

The plastics industry employed a high of 115,000 Canadians in 1989 (although the recession has caused some erosion from that total). The production of injection moldings and extruded plastic products account for more than 60% of these jobs. Plastic processing workers are also involved in vacuum forming, blown films, extrusion blowing, rotary molding, additive and compound formulating, injection blowing, fibreglass-reinforced plastics production, and recycling.

Thermoplastics
become soft and fluid when heated and can then be molded and manipulated. When the resins cool, they solidify and take the form of the mold. Thermoplastics can be remelted and remolded repeatedly (although with a slight decrease in polymer integrity over time).

Thermosets
can also be softened (when heated) and molded. However, these resins are hardened or "cured" by an irreversible chemical reaction which creates strong cross-links between the polymer molecules. Once formed, thermosets cannot be remelted without degrading the resin.

A MINI-GLOSSARY OF ENGINEERED PLASTICS

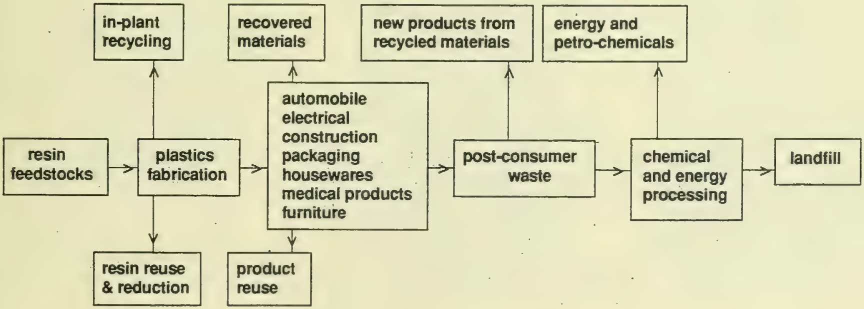
Cellular plastics
By using a blowing agent, flexible and rigid foam plastics can be created.

Laminated plastics
Several layers of different plastic resins can be laminated together to create products that offer a number of useful characteristics. Squeeze bottles and many snack food bags are made of laminated plastics.

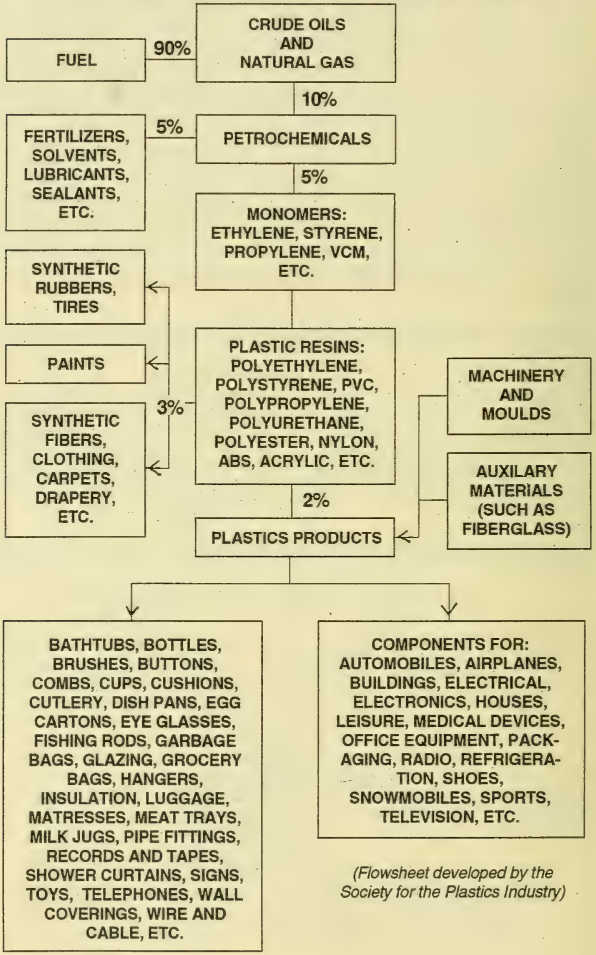
Reinforced plastics
Plastic resins can be poured over different fibres to form stronger molded products. The fiberglass hulls of boats are an example.

Composite materials
Layers of plastic, cardboard and foil may be adhered together to form microwavable serving trays or aseptic drink boxes.

THE PLASTICS LIFE CYCLE



THE PLASTICS PRODUCTION CYCLE


CRUDE OILS AND NATURAL GAS
90%
FUEL
10%
PETROCHEMICALS
5%
FERTILIZERS, SOLVENTS, LUBRICANTS, SEALANTS, ETC.
5%
MONOMERS: ETHYLENE, STYRENE, PROPYLENE, VCM, ETC.
SYNTHETIC RUBBERS, TIRES
PAINTS
3%
SYNTHETIC FIBERS, CLOTHING, CARPETS, DRAPERY, ETC.
PLASTIC RESINS: POLYETHYLENE, POLYSTYRENE, PVC, POLYPROPYLENE, POLYURETHANE, POLYESTER, NYLON, ABS, ACRYLIC, ETC.
MACHINERY AND MOULDS
AUXILARY MATERIALS (SUCH AS FIBERGLASS)
2%
PLASTICS PRODUCTS
BATHTUBS, BOTTLES, BRUSHES, BUTTONS, COMBS, CUPS, CUSHIONS, CUTLERY, DISH PANS, EGG CARTONS, EYE GLASSES, FISHING RODS, GARBAGE BAGS, GLAZING, GROCERY BAGS, HANGERS, INSULATION, LUGGAGE, MATRESSES, MEAT TRAYS, MILK JUGS, PIPE FITTINGS, RECORDS AND TAPES, SHOWER CURTAINS, SIGNS, TOYS, TELEPHONES, WALL COVERINGS, WIRE AND CABLE, ETC.
COMPONENTS FOR: AUTOMOBILES, AIRPLANES, BUILDINGS, ELECTRICAL, ELECTRONICS, HOUSES, LEISURE, MEDICAL DEVICES, OFFICE EQUIPMENT, PACKAGING, RADIO, REFRIGERATION, SHOES, SNOWMOBILES, SPORTS, TELEVISION, ETC.

(Flowsheet developed by the Society for the Plastics Industry)

"Plastic" does not mean "throw-away"
Plastics are prized for their strength, resiliency and resistance to wear. Durable plastic products are designed for years of use and reuse.

THE MAJOR PLASTIC RESIN GROUPS

Acrylics

These resins are hard, crystal-clear and resistant to some chemicals and weather. Acrylics are available in a wide range of colours and forms (from stiff thermoplastics to soft, flexible types).

Uses: Used to glaze safety windows, skylights and doors, make decorative signs, automobile tail lights, furniture, appliance panels and knobs, display cases, video and audio storage disks, etc..

Recyclability: Under development.

Acrylonitrile Butadiene Styrene (ABS)

The properties of ABS are contributed by its three monomers: its chemical resistance and heat stability comes from the acrylonitrile; its toughness and impact strength from the butadiene; and its rigidity and ease of processing from the styrene.

Uses: ABS is used in the transportation sector (panels, grills, trim, headlight housings, etc.), major appliances (the doors, liners and trays of refrigerators), computer housings, consoles, telephones, pipes and fittings, toys, shower stalls, cosmetic packages, and so on.

Recyclability: Several commercial facilities are recycling ABS from IC&I post-consumer sources.

Epoxies

These tough, resilient resins exhibit good adhesion, corrosion resistance, UV resistance, thermal and electrical properties, and low shrinkage characteristics.

Uses: The major markets for epoxy resins are in the fields of protective coatings (including tank linings, heavy-duty industry, marine environments, airplanes, farm equipment, etc.) adhesives, electronic and computer components, tools and outdoor applications, flooring compounds, binders, patching and other construction materials.

Recyclability: Under development.

High Density Polyethylene (HDPE)

A tough, translucent or opaque thermoplastic, HDPE is resistant to chemicals and moisture. Slightly waxy to the touch with a non-shiny, matte finish, HDPE containers can be coloured or a "natural" hue. HDPE is characterized by its stiffness, low cost and ease of forming. Both rigid and flexible forms are available.

Uses: HDPE is used to make containers such as milk and water jugs, juice containers, liquid detergent and bleach bottles, ice cream tubs and motor oil

WHAT ARE THE MAJOR RESINS USED IN ONTARIO?

The Thermoplastics

Low and linear low density polyethylene (LDPE & LLDPE)
High density polyethylene (HDPE)
Polyvinyl chloride (PVC)
Polypropylene (PP)
Polystyrene (PS)
Polyethylene terephthalate (PET)
Acrylonitrile butadiene styrene (ABS)
Polycarbonate (PC)
Acrylics
Nylon

The Thermoset Plastics

Polyurethanes
Phenolics
Urea and melamines
Epoxies

containers, as well as pails, crates, pipe, tarpaulins, sporting goods and protective head gear. Also used to make plastic bags.
Recyclability: HDPE is highly recyclable, provided it can be cleaned of contaminants. Since it is difficult to control the colour of the final recycled HDPE product, it can be coated with virgin HDPE of the desired colour when remanufactured.

Low and Linear Low Density Polyethylene (LDPE & LLDPE)

A tough, light-weight and flexible resin, LDPE/LLDPE is available in both film and rigid forms. The resin is widely used in applications requiring inertness, processing ease and a good moisture barrier. Formulations can be nearly transparent or opaque, high gloss or low.
Uses: LPDE is used to make the bags used by dry cleaners, sandwich bags, wraps for baked goods and meats, trash bags, milk pouches, and most soft plastic shopping bags. LDPE/LLDPE is also used in the "shrink" wrapping that covers thousands of consumer and commercial products, as well as some rigid items (such as lids) or coatings on food cartons, wires and cables.
Recyclability: LDPE/LLDPE plastic bags, provided they are clean, are highly recyclable. The tackifier added to "stretch" wrap to increase its stickiness makes it more difficult to recycle this LDPE/LLDPE product, but it is being done through recently developed technology.

Nylon

Nylon is a tough, stiff and strong (especially at high temperatures) resin that exhibits good resistance to chemicals, wear and abrasion.
Uses: Used in snaps, clips and fasteners, stockings and garments, carpet staple and tire cord, lubricated gears and bearings, fishing line, food pouches and wraps, microwave serving bags, casters, combs, auto body parts and air bags, power tool housings and hardware.
Recyclability: Commercial nylon recycling is available.

Phenolics

The strong cross-links in this thermoset resin offers excellent stability, and heat and creep resistance. A number of engineered and general-purpose phenolics are available, incorporating a wide variety of fillers and fiber reinforcers to increase their strength, wearability, and impact resistance.
Uses: Phenolics are used in high-temperature appliances, such as toasters and ovens, pot handles, wiring devices, gears and pulleys, manifolds and other auto parts, and electrical connectors, switches and other components.
Recyclability: Recycling technology is under development.

THE RESIN CODING SYSTEM SUPPORTS SOURCE SEPARATION AND RECYCLING

The plastics industry has developed a voluntary coding system to make it easier to identify household plastics. The six types of plastic resin most likely to be used to make bottles, jugs and other containers are each marked with their own distinctive code number and symbol. An additional, miscellaneous category marks those other plastics that may be used in consumer packaging. The symbols incorporate an easy-to-recognize mark — a triangle formed by three arrows — and are now used by plastics manufacturers across Canada and around the world. These codes appear on page F.7.

Polycarbonate (PC)

PC is a resin prized for its toughness and clarity, with excellent electrical properties and heat deflection characteristics.

Uses: This clear resin is widely used to make vandal-proof windows, lighting systems, safety lens and glasses, sports equipment and riot gear. PC resins are also used in unbreakable beer mugs, microwave ovenware and tableware, compact disks, breaker boxes and housings, gears, and headlights, instrument panels and other car parts.

Recyclability: Commercial PC recycling is available.

Polyethylene Terephthalate (PET)

A transparent, tough and shatter-proof polyester resin, PET can be formulated in clear or coloured forms.

Uses: PET is most commonly used to make two-litre soft drink bottles. PET containers are also used to package liquor, edible oils, peanut butter, some household cleaners, toiletries and cosmetics. PET is also used in textiles, fibrefill insulation, electrical components and automotive parts.

Recyclability: PET is highly recyclable, with current demand far exceeding supply. The future market for this material also looks strong. However, PET must be kept pure of other plastic wastes. For example, PET and PVC are incompatible polymers; a small amount of one can compromise the recyclability of the other.

Polypropylene (PP)

PP is a light thermoplastic prized for its heat and chemical-resistance. Smooth-surfaced, semi-rigid and scratch-proof, PP will not crack easily when flexed. PP can be found in a wide range of colours, and in transparent, clear and opaque forms.

Uses: PP is used to make plastic caps and lids for other containers, the wrappings (for example, on cigarette packs and candies), ropes and twine, textiles, carpet and carpet backing, drinking straws, broom fibres, battery casings, a number of food containers, storage boxes, and many other products.

Recyclability: While PP products are not yet widely recycled, most of the PP resin found in dead car batteries is recycled into the next generation of batteries. The resin can be mixed in small amounts with LDPE/LLDPE and HDPE.

Polystyrene (PS)

These easy-to-process resins are used in two quite different ways. Expanded (or foamed) polystyrene is prized for its insulating and protective properties and is light-weight and opaque. Some manufacturers formerly used CFCs as a blowing agent in the production of PS foam products, but this practice was abandoned in the 1980s. Not all polystyrene is used in blown foam applications.

1
PETE
Polyethylene
Terephthalate (PET)

2
HDPE
High Density
Polyethylene

3
V
Polyvinyl Chloride

4
LDPE
Low Density
Polyethylene

5
PP
Polypropylene

6
PS
Polystyrene

7
OTHER

Other PS commercial grades include General Purpose Polystyrene (GPPS), High Impact Polystyrene (HIPS), and Medium Impact Polystyrene. These stiff, yet flexible, PS resins can be transparent or opaque, clear or coloured.

Uses: Foamed PS is widely used in disposable coffee cups, meat trays, fast food containers, egg cartons, home insulation, and molded packaging pieces. (STYROFOAM* is a well-known trademark for a blue rigid-foam insulation. There is no such thing as a "styrofoam" cup.) Other PS resins are used in clear carry-out food containers, trays, lids, appliances, furniture, housewares, utensils, "wide-mouth" containers, etc..

Recyclability: PS products can be readily recycled into new products. A growing amount of recyclable PS, including molded packing materials, used beverage cups, plates, meat trays, and other food containers, is being collected from homes, businesses and institutions.

Polyurethanes

This family of relatively low-cost and easy-to-process resins is so large and diverse that its not possible to compile a list of common properties. Polyurethanes are available in a wide range of densities, hard and soft forms, and engineered versions.

Uses: High-strength, fibre-reinforced composites are used in the construction industry, machine housings, body panels for cars and farm equipment, seating and cushioning, and footwear. Flexible and rigid foams, laminates, boardstock, coatings and adhesives, and injection molding products are also on the market.

Recyclability: Some scrap polyurethane foam from IC&I sources is being reground for use as carpet underlay.

Polyvinyl Chloride (PVC)

A shiny, tough and chemical-resistant resin, PVC is available in translucent, transparent and opaque forms.

Uses: PVC is used to make many products including bottles (for mineral water, cooking oil, liquor, mouthwash, shampoo and other personal care products, cosmetics etc.), meat wrappings, blister pack bubbles, sewer pipes, pool liners, garden hoses, siding and flooring, credit cards and shower curtains. Any clear, colourless bottle not made of PET is likely made of PVC.

Recyclability: PVC is recyclable as long as the resin is not mixed with other types of plastic types and the proper processing conditions are maintained.

Urea and Melamines

These resins are available as liquids, spray-dried solids and filled molding compounds. Heat and catalysts transform them into hard, infusible products in a wide variety of colours.

Uses: Melamines are used in stain-resistant laminates, chemically-resistant

ADDITIVES

Plastic resins can be formulated and tailored to meet a wide variety of products. Altering the way the monomers are connected and packed together will determine the density of the plastic, the length of molecules in the polymer chain and the nature of the polymer formed. Incorporating various curatives, fillers, stabilizers and other additives will also modify resin characteristics.

Of the hundreds of additives on the market, most fall into the following categories:

antimicrobials
antioxidants
antistats
blowing agents
colorants
flame retardants
heat stabilizers
lubricants
organic peroxides
plasticizers
property modifiers
UV stabilizers
urethane catalysts

** A registered trademark of the Dow Chemical Company* coatings, wall coverings and decorative products. They are also used as adhesives and bonding agents (for use with plywood, particleboard, wood chips, furniture, glass or mineral fibre mats, abrasive papers, and foundry cores), as well as to make electrical parts, military equipment, dinner plates, appliance controls, toilet seats, buttons and a number of other molded plastic products. **Recyclability:** Under development.

Table F.3
CONSUMPTION OF MAJOR RESIN GROUPS IN CANADA

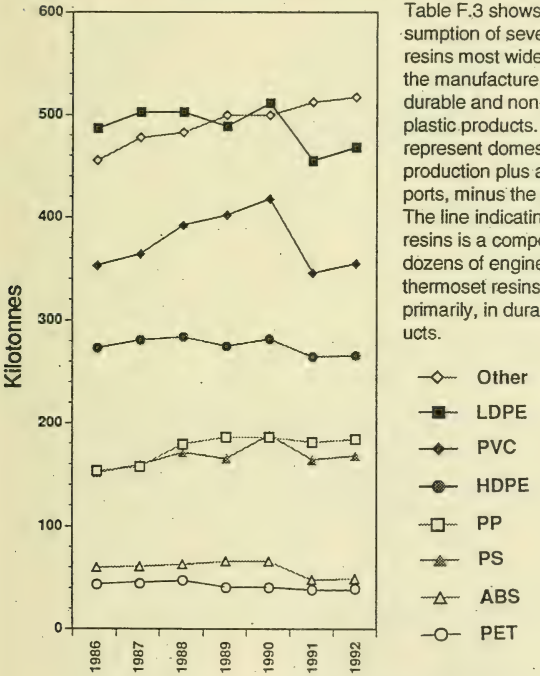


Table F.3 shows the consumption of seven of the resins most widely-used in the manufacture of both durable and non-durable plastic products. The data represent domestic resin production plus any imports, minus the exports. The line indicating "Other" resins is a composite of dozens of engineered and thermoset resins used, primarily, in durable products.

(Based on data compiled by the Society for the Plastics Industry (SPI).)

Table F.4
MAJOR CANADIAN RESIN MANUFACTURERS

PRODUCER	LOCATION	RESIN CAPACITY (000 TONNES)							
		POLYETHYLENE							
		LDPE	LLDPE	HDPE	PP	ABS	PS	PVC	PET
AT Plastics Inc.	Edmonton, Alberta	75							
B.F. Goodrich	Niagara Falls, Ontario							230	
	Ft. Sask., Alberta							115	
Dow Chemical Canada Inc.	Sarnia, Ontario	85		60			105		
	Ft. Sask., Alberta		165						
Dupont Canada Inc.	Sarnia, Ontario		240						
GE Plastics	Cobourg, Ontario					40			
Himont Canada Inc.	Varennes, Quebec				135				
Huntsman Russtek	Mansonville, Quebec						12		
Imperial Oil	Sarnia, Ontario		205					120	
Kodak Canada	Toronto, Ontario								45
Monsanto Plastics	La Salle, Quebec					30			
Novacor Chemicals (Canada) Ltd.	Sarnia, Ontario	85		180					
	Red Deer, Alberta			470					
	Cambridge, Ontario						38		
	Montreal, Quebec						38		
Petromont Inc.	Montreal East	150							
Plasti-Fab Ltd.	Calgary, Alberta						8		
Scott Polymers Ltd.	Montreal, Quebec						16		
Shell Canada Chemical Corp.	Sarnia, Ontario				170				
TOTAL		**395**	**610**	**710**	**305**	**70**	**217**	**465**	**45**

(Based on data supplied by the Canadian Plastics Statistical Yearbook; SPI Canada/1991)

HOW DO WE USE PLASTICS?

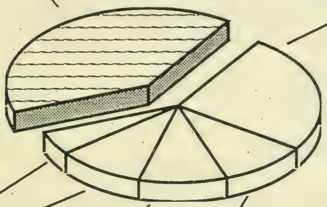
☐ DURABLES

▤ NON-DURABLES

40 %
Packaging,
bottles, containers, tubs and pails, lids and caps, bags, stretch wrap and shrink wrap, foam packing material, crates, etc.

25%
Building and construction,
including glazing, window fittings and skylights, panels and siding, wall coverings, eaves, flooring, tiles, plumbing, pipes, fittings and conduits, decorative laminates, vapour barriers and insulation, lighting fixtures

5%
Electrical components,
including sockets, connectors, relays, switches, plugs and covers, circuits and chip carriers, coil bobbins, terminal blocks, mounts and brackets, breaker boxes, gears, wire coating and insulation, telephone and computer housings, etc.



10%
Automobiles and transportation uses,
there is an average of 100 kilograms of plastic in every new car including bumpers, grills, body parts, housings, filters, gaskets, fittings, seals, pipes and hoses, cables and clips, paneling, linings, covers, upholstery and seating, floormats, insulation and paint

10%
Miscellaneous,
including, organic coatings, adhesives, textiles, pipelines and irrigation systems, medical supplies, biomaterials and surgical implants, toys and sporting goods, suit cases, records, etc.

10%
Furnishings,
including furnishings, appliances, housewares, tableware, mattresses, etc.

(Based on data compiled by the Society for the Plastics Industry (SPI).)

THE GROWING MARKET FOR PLASTICS

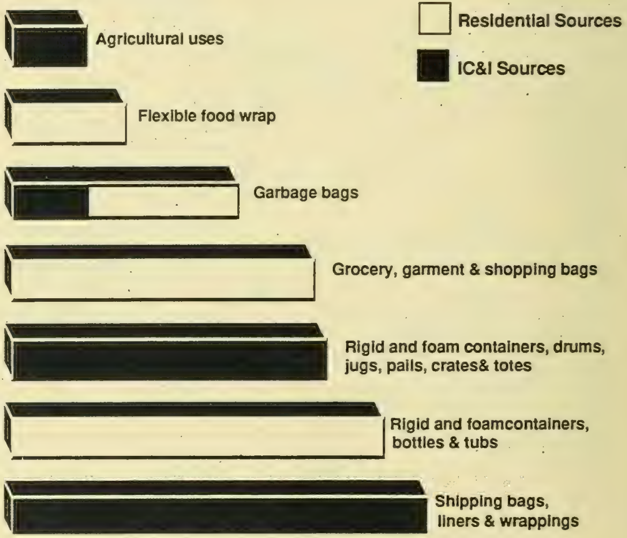
Durable, light-weight and corrosion-resistant plastics are increasingly being used in place of wood, steel and other traditional materials. An array of new uses and new resin technologies will continue to expand the market for plastics during the 1990s. Many of these plastics are specialized, highly engineered resins that will not be accommodated easily by the current recycling infrastructure. As these new plastics enter the marketplace and, eventually, the waste treatment system, new collection and separation methodologies, recycling technologies and recovered resin markets will need to be developed to maximize their diversion from disposal.

Table F.5
MAJOR CLASSES OF PLASTIC PACKAGING

Plastics are one the most important materials used in packaging today. Hygienic, strong, air-tight, waterproof and shatterproof, plastic packaging protects products from the factory ... to the store ... to the home ... to the moment they are finally opened and used. They prevent damage, spoilage and waste. Light-weight plastics also save energy during shipping.

Over 90% of the plastic packaging used by Canadians is made from six types of plastic: polyethylene terephthalate or PET, high density polyethylene, low density and linear low density polyethylene, polyvinyl chloride, polypropylene, and polystyrene.

Polyethylene, both high and low density resins, is used to make over half the packaging. This versatile plastic can be made into stretchable (and non-stretchable) films, transluscent (and opaque bags), and a host of containers.



These products account for more than three-quarters of the plastic resins used in packaging.

(Based on data supplied by the Society for the Plastics Industry.)

THE GROWING MARKET FOR PLASTICS

Agricultural Uses
Advances in "plasticulture" include new films that suppress weeds, protect seedlings from pests, enhance growth and aid mulching, greenhousing and silage retention

Fibre Optics
Plastic cables and wrappings can be used to transmit more information, more quickly and more clearly than conventional transmission systems

Digital Recording
Revolutionary tape and disk storage techniques are putting more information on smaller surfaces at lower cost than ever before

Bridge Redesign
Light-weight composite plastics — stronger than steel and more durable than concrete — are being used in the cables, decks, plates and tendons of both new and refurbished bridges

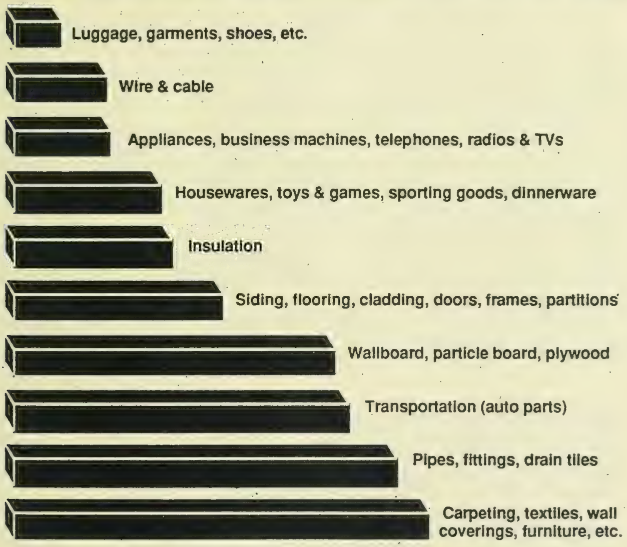
Redesigning Cars
The next generation of engineered plastics and composites will change the shape of tomorrow's cars with their unitized body designs, bonded shells, space frames (that hold non-structural panels), and disassembly opportunities (cars that are designed to ease recycling)

Table F.6
MAJOR CLASSES OF DURABLE PLASTIC PRODUCTS

Durable products are things that are not thrown away, at least not right away. They are usually defined as items with a useful life of more than three years and include construction materials, appliances, automobile parts and housewares.

As opposed to the non-durables, primarily packaging which is dominated by six major resin groups, durables are made from a host of thermosets and thermoplastics including a wide variety of specialized and engineered resins. PVCs (used in piping, construction, electronics, furnishings and many other products) account for about 26% of the total durables market, followed by polypropylene and polyethylenes (11% each), polystyrene and polyester (8.5% each), ABS (4%) and dozens of other resins (making up the remaining 31%).

Durables are not widely collected and recycled. However, there are a growing number of reuse and repair programs in place. While pilot programs are underway to recycle certain durables, a great deal of R&D work is still needed.



These applications account for some 87% of the resins used to make durable plastic products.

(Based on data supplied by the Society for the Plastics Industry (SPI).)

THE GROWING MARKET FOR PLASTICS

Solar Heating
Plastic pumps, valves andcollectors are important components of absorber panels (for swimming pools), flat bed collectors for household water heaters and other solar systems

Photovoltaics
Clear, tough, weather-resistant plastic frames, lenses and other components are being used to transform the sun's energy into electricity

Medical Implants
Flexible, light-weight plastics are being used as artificial joints and valves, biodressings, bioelectrodes and other sensors in plastic shells, and surgical implants that can monitor and medicate when needed

Membrane Switches
Touch pads and screens are making computer, home appliances, supermarket directories and children's games a little more user-friendly

Diamondizing
Clear, super-hard and scratch-resistant surfaces can be applied to plastics and metals using this new coating technique

Silica Coatings
A microscopic, transparent silicon dioxide film may expand the market for recyclable plastic bottles

The 3Rs
REDUCE — REUSE — RECYCLE

THE FIRST R — REDUCTION

Consumers are familiar with the concept of waste reduction. They may refuse to take a bag when they make a small purchase. They may bring their own containers from home to be filled from the bulk peanut butter dispenser in the local health food store.

Manufacturers are also adopting the "first R." There are many examples of companies reducing post-consumer solid wastes by switching to plastic packaging systems. In the past, 24 soft drink cans would be packaged in a cardboard box, but are now sold nestled on a cardboard flat and wrapped in plastic film. The switch cuts the packaging weight by 75%, while reducing shipping costs and waste.

The use of tough and durable plastic containers have also eliminated, in many cases, the need for bulky protective overwrappings (most of which are thrown away as soon as the product reaches the consumer's residence). Sturdy HDPE shampoo bottles and stand-up toothpaste tubes are now routinely sold without their outer cardboard boxes.

In addition, light-weight and thin plastic products have contributed substantially to waste minimization by replacing many thicker, heavier materials previously used for packaging. For example, a thin-walled plastic bottle can hold as much as ten times more liquid than a glass bottle of the same weight. And plastic bags are lighter and more compact than paper bags. One thousand paper shopping bags would form a stack 117 centimetres high and weigh 63.5 kilograms; an equivalent number of plastic bags would form a 9-centimetre pile and weigh just 7 kilograms.

One study showed if all plastics were eliminated from packaging, the volume of packaging would more than double, its weight would increase fourfold, and packaging costs and energy use would each double.

New processes and designs are cutting wastes

New resin formulations and improvements in processing technology are making it possible to make lighter and thinner plastic packagings. Down-gauging films and light-weighting molded products also conserve resins while reducing wastes. For example:

* the HDPE milk jug, that weighed 95 grams in the early 1970s, weighs only 60 grams now, while still holding the same amount of milk;

* the two-litre PET bottle is 20% lighter than when it was introduced in 1977;

* plastic grocery bags, which were 0.058 mm thick in 1976, were down to 0.044 mm by 1984, and 0.018 mm in 1989 — a raw material savings of some 70% with

25 years ago, plastic polyethylene milk pouches were introduced in Ontario

Today, three-quarters of all milk is sold to consumers in plastic pouches, eliminating approximately 10,000 tonnes of cardboard and other solid waste. Pouch packaging cuts the weight of packaging waste by 75% and the volume going to landfill by 91%. In addition, PE plastic milk pouches are now being collected and recycled in a number of Ontario communities.

Instead of bags, shoppers at Knob Hill Farms purchase sturdy plastic boxes.

These are wheeled around the supermarket on multi-level carts, run through the checkout, and loaded into the customer's car. The system is also being tested at stores in London, Burlington and Montreal.

no loss in bag strength or durability; and

* the use of HDPE or PP resins and modified mold designs have allowed manufacturers to down-guage the thickness of the margarine tub by nearly 30% and the five-gallon HDPE pail by 10%, from 960 to 860 grams.

THE SECOND R — REUSE

A considerable amount of waste is also being eliminated by replacing throw-away cardboard shipping cartons, steel drums and wooden boxes with reusable plastic containers. (Of course, some metal drums, wooden boxes and card-board cartons can also be reused.) Because of their strength, durability and resistance to corrosion and moisture, plastics containers can be refilled over and over again.

Plastic crates are being used to carry soft drink bottles home from the store. Returnable, stackable shipping totes filled with automobile parts are being shipped to assembly plants across Ontario. And resealable sandwich bags and rigid containers are keeping lunches fresh.

Refills of fabric softeners, dishwashing detergent, liquid cleansers and other consumer products are now being offered in concentrated form and packaged in flexible plastic pouches. The original rigid plastic container can be reused again and again, reducing packaging waste by an estimated 70%. This could save more than 400,000 kilograms of resin per year. Some two-cap bottles come equipped with a molded-in measuring cup and a wide-mouth for refilling.

European experience has shown that returnable polycarbonate milk bottles are capable of being refilled up to one hundred times — four to five more times, on average, than reusable glass milk bottles. They are also molded with protective bands to prevent surface scratching during transport and handling and prolong their useful life.

Sheets of stretch wrap and returnable plastic pallets are replacing cardboard shipping cartons and one-way wooden pallets. The light-weight LDPE/LLDPE film is easily compactable and can be recycled. The pallets can be used for years.

Many suppliers are now packing chemicals and raw materials in returnable/refillable plastic drums. A removable plastic liner inside the drum may allow it to be reused without extensive decontamination or cleaning. And, in the case of resin deliveries, a specially formulated resin shipping bag can be added to the fabricating process with the rest of the shipment.

In some cases, the reuse of plastic drums and other packaging systems may require the establishment of centralized facilities for cleaning and refurbishing the products. This is currently being done in Ontario by a number of companies that collect, repair and resell drums, pallets, toner cartridges (from laser printers), and other plastic products.

A RECYCLING MINI-GLOSSARY

Primary Recycling
processes relatively clean and segregated plastic scrap into new products with properties similar to those of the original resin

Secondary Recycling
turns mixed or contaminated plastic scrap into new materials with properties that differ from those of the original plastic products

Tertiary Recycling
breaks mixed or single resin post-use plastics down into its basic monomers or hydrocarbon constituents, which can be used as a fuel, feedstock or a raw material to make new plastic resins

Quaternary Recycling
recovers the energy content of plastics by using them as a fuel source in an energy-from-waste facility

THE THIRD R — RECYCLING

A viable recycling program depends on five components: (1) a dependable supply of high quality, used plastic feedstocks, (2) and efficient and cost-effective collection system, (3) a healthy recycling industry, (4) firm value-added markets for the recycled resins, and (5) adequate funding (at least for municipal collection programs). If these conditions are met, the recycling of post-consumer plastics will dramatically reduce the amount of plastic going to disposal.

Despite the progress made to date in recycling the waste and scrap generated by plastic producers and fabricators, the technology for recycling mixed residential plastics and certain resins is still being developed or improved. On the other hand, viable systems for recycling PET bottles, PE films, HDPE, polystyrene, polypropylene and PVC have been developed. It is also possible to recycle commingled or mixed plastics. A number of other resin groups are also being handled in pilot and full-scale facilities across North America.

As the technology becomes more efficient and responsive to the needs of industry and the public, recycled plastics are finding a new life in dozens of new uses — oil and paint drums, bottles and pails, insulation, construction materials, grocery sacks, trash bags, carpeting, appliance handles, toys, sporting goods, boat hulls, flower pots, lumber substitutes, and recycling's Blue Boxes.

Over 50% of all the two-litre PET soft drink bottles used in Ontario — some 2,500 tonnes in 1991 — are now being collected for recycling. After aluminum, PET and high density polyethylene (HDPE) have the highest scrap values of all the materials being collected in municipal recycling program.

Plastics recycling can be subdivided into three primary categories:

* Primary Recyclers are sorting and recycling particular post-industrial and/or post-consumer resins to be used again in the manufacturing of new plastic products.

* Secondary Recyclers that are recycling mixed plastics to make lumber-like plastic products to replace certain building materials.

* Tertiary Recyclers regenerating and purifying plastic monomers from certain types of resins for making new resins and other products.

PRIMARY RECYCLING

The successful recycling of single or compatible resins starts with sorting. Even relatively small amounts of certain resins, unless they are removed, can ruin the recyclability of the primary plastic feedstock. In addition, a number of non-plastic contaminants may foul the recycling equipment and compromise the process. Bottle caps, toxic or hazardous materials in half-filled containers, dirt and stones, and large quantities of food or organic materials must be removed by hand or some other sorting method.

Plastic-from-plastic separation is often done in a settling tank, with the

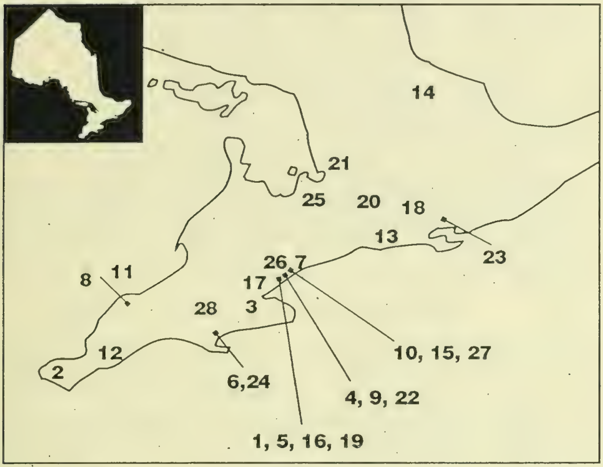
RECYCLING SUCCESS STORIES

The **Canadian Polystyrene Recycling Association's** (Mississauga) modern facility, which opened its doors in October, 1991, is capable of recycling up to 6,000 tonnes of rigid and foam PS a year. The reclaimed resin is used to make office and school supplies, video cassettes and protective industrial packaging.

Resource Plastics Inc (Brantford) handles both IC&I and residential post-consumer plastic scrap, including polypropylene, HDPE and LDPE. Resource Plastics has become one of North America's largest recycler of post-consumer plastics.

Table F.7

ONTARIO COMPANIES RECYCLING POST-CONSUMER RESINS



In 1987, there were no companies recycling post-consumer resins in Ontario. Today, there are more than two dozen recyclers handling IC&I and residential PCR. These include:

1 Alpha Manufacturing (Brampton) — PVC
2 Branch Industrial (Windsor) — PE
3 CAN AM Plastics Inc. (Hamilton) — HDPE film
4 Canadian Polystrene Recycling Association (Mississauga) — PS
5 CRC, Canadian Recycling Corporation Ltd. (Brampton) — HDPE film
6 DEKKA Resins Inc. (Brantford) — PP, PS
7 Desbro Polymers (Canada) Inc. (Scarborough) — HDPE
8 Entropex (Sarnia) — PE
9 Enviroblock, Surfacing System Canada Inc. (Mississauga) — mixed
10 Everwood (Toronto) — mixed
11 JMS Envirosave Inc. (Sarnia) — HDPE
12 Kent Plastic Products (Blenheim) — mixed
13 Mobile Reduction Services (Cobourg) — ABS
14 Near-North Recycling (Algonquin Park) — film
15 Norseman Plastics Ltd. (Toronto) — HDPE
16 Nu-Plast Inc. (Brampton) — LDPE, HDPE film, PS, ABS
17 PCL Packaging (Burlington) — LDPE/LLDPE
18 Plastic Manufacturing Inc. (Peterborough) — PE
19 Plasticycle (Brampton) — film & blends
20 Plas-re-tec (Lindsay) — mixed
21 Polyethics Recycling Industries Inc. (Orillia) — PE film
22 Polymart (Mississauga) — PE
23 Polymerland Canada Inc. (Belleville) — ABS, PC
24 Resource Plastics Inc. (Brantford) — PE, PP
25 Rivalries Corp. (Barrie) — mixed
26 Royal Plastics (Woodbridge) — PVC
27 Sterling Recycling Ltd. (Etobicoke) — HDPE
28 Terra Plastic Recycling Inc. (Cambridge) — mixed

As is the case in many industrial sectors, the wastewaters from recycling operations must be carefully treated.

Municipal, provincial and federal clean water standards govern the levels of pollutants, such as suspended solids, lead, mercury, arsenic and other heavy metals, as well as biochemical oxygen demand (BOD) and chemical oxygen demand (COD). Dust and odour controls are also important to guarantee a safe, healthy and hygienic workplace.

lighter resins floating to the surface. A centrifuge-like hydrocyclone and the addition of chemical surfactants can improve the separating efficiency. However, not all resins can be separated in this manner.

Manual sorting can be used to separate easily recognizable resins, as well as obvious contaminants. It can also be used to colour separate plastics, or different grades of a generic resin: for example, five-gallon pails or detergent bottles from a mixed HDPE plastic feedstock.

Manufacturers and university researchers are working on new, mechanized sorting systems that will eventually eliminate tedious and expensive hand sorting. In the future, automatic sorting systems may use low-level X-ray fluorescence, light-emitting diodes, electrostatic forces, and jet air streams to separate containers passing on a high-speed conveyor belt.

After separating the target resin(s), primary recycling typically involves washing and conversion into either flakes or pellets. While the process varies from facility to facility, it would likely include a number of the following steps. Very few plants would incorporate all these stages.

THE PRIMARY RECYCLING PROCESS

Shredding plastic containers produces strips one-to-three inches long.

Granulation cuts the shredded feedstock into smaller particles.

Wet granulation, using hot or cold water, softens and separates some of the contaminants that stick to the scrap. The water may be filtered clean and reused.

Air classification separates paper and other light contaminants.

Washing with detergents loosens food, dirt and stuck-on labels, although detergents may create subsequent water treatment problems.

Rinsing with clean water removes both the contaminants and the cleaners.

Dewatering is done with centrifuges and/or presses.

Drying in mechanical or thermal dryers reduces the final moisture content to less than half of one percent by weight.

Electrostatic separation uses electric fields to charge and remove aluminum and other metal particles.

Thermoplastics may be melted, using heat and/or pressure, and filtered to remove any residual contaminants.

Pelletizing transforms the clean flakes into small pellets identical to virgin resins. Colourants and other additives may also be added.

Ship PCR to market end-users.

NORTH AMERICAN PRODUCTS MADE FROM RECYCLED RESINS

From blended recycled LDPE ...
* agricultural film
* trash bags
* grocery sacks
* irrigation pipes

From blended recycled PP ...
* auto parts
* auto batteries
* geotextiles
* industrial fibres
* plastic handles
* pails and boxes
* bag dispensers
* recycling containers

From blended recycled PS ...
* insulation board
* office equipment and accessories
* toys
* packaging "peanuts"
* molded protective packaging
* cassette cases
* reusable cafeteria trays

From mixed or commingled resins ...
* marine pilings
* docks and wharves
* landscape timbers
* animal pens
* roadside posts
* agricultural fencing

SECONDARY RECYCLING

Recycling mixed plastic wastes, containing several types or resins, reduces the problems inherent in separating and sorting (although some hand sorting may be necessary to remove metal, glass and other contaminants in the waste stream). A limited amount of composite material — usually less than 5% of the total — can also be tolerated in the feedstock.

The end product of most mixed-resin processing is a plastic lumber-like material. Resistant to rot, splitting, fading and insect attack, the "plastic lumber" can be used to make picnic tables, park benches, guard rail posts and docking material. Molded products, such as one-piece pallets or storage bins, can also be made from the commingled resins.

Other processes separate out the polyethylenes and polypropylenes, and produce a pellet exhibiting characteristic properties dependent on the composition of the feedstocks. These blended resins are typically inferior to those produced by single resin recycling.

Mixed resin processing typically involves a multi-step operation including:

* sorting and quality control;
* granulation;
* blending (in some cases, a minimum amount of a particular resin is needed to act as a carrier for the unmelted fraction of the mix);
* extrusion or molding; and
* cooling, during which the temperature is carefully monitored to prevent the warping of the finished product.

TERTIARY RECYCLING/DEPOLYMERIZATION

One worrisome problem with plastic recycling is the fact that, in many cases, cleaned and pelletized scrap cannot be guaranteed to be contaminant-free. In addition to a wide variety of colourants, fillers and other additives that may be present, unintentional contaminants may impregnate the plastic flakes. Product residues, dirt, and materials such as gasoline and motor oil that are sometimes stored in empty containers may compromise the value of plastic recycling feedstocks.

Durable plastics also present some unique recycling problems. Auto shredder residues (known as fluff), wire and cable wastes, small appliances, larger "white goods" (such as refrigerators) and other durables may contain difficult-to-recover plastics.

By reducing a plastic resin to its basic monomer building blocks, it is possible to eliminate pollutants and other mixed wastes. A number of terms are used to describe these advanced recycling technologies: depolymerization,

MORE N.A. PRODUCTS MADE FROM RECYCLED RESINS

From blended recycled PET ...

* carpets and carpet backing
* fiberfill insulation
* non-food bottles and containers
* geotextiles
* boat hulls
* shower curtains
* paintbrush bristles
* audio cassette cases
* scouring pads
* office binders

From blended recycled HDPE ...

* bottles for cleaning products
* motor oil bottles
* construction and snow fence
* drainage pipes
* trash cans
* drums and pails
* milk bottle cartons
* shipping pallets
* grocery sacks

From blended recycled PVC ...

* drainage pipes
* highway traffic cones
* flooring tiles

chemical recycling, or regeneration. They are all forms of tertiary recycling and involve breaking down a plastic feedstock into its constituent monomers and hydrocarbon roots. Depending on the technology used, these compounds can be used to make new plastics, other petrochemical products, or crude oil-like fuel stocks. The end result is to open up a variety of new end-uses and new markets for post-industrial and post-consumer plastic wastes.

For example, used PET bottles may be treated through one of several processes that have been developed to yield its two monomer feedstocks: dimethyl terephthalate (DMT) and ethylene glycol (EG). These monomers, in turn, may be further purified through distillation and crystallization, with the DMT destined for reuse in new PET products and the EG directed into the antifreeze market.

Thermoplastics — which constitute the majority of all plastics produced in Canada — can be decomposed by both chemical and thermal methods. The mechanism and products of decomposition of each plastics family determine which method is practical and profitable. For example, it is more advantageous to pyrolyze polyolefins than to chemically decompose them. (There is no easy way to chemically attack the hydrocarbon structure of polyolefins other than by oxidation, which is not easily controlled.) Pyrolysis of uncontaminated polyolefins (or mixtures of plastics containing high levels of polyolefins) yields products ranging from usable waxy solids to greases, fuels, and oil fractions high in kerosene and gasoline.

Tertiary recycling is still in its introductory stage, but it shows great potential for growth. To date, all the commercial and experimental facilities are located in the U.S., Europe and Japan. Methanolysis has attracted a lot of attention. In the U.S., Coca-Cola, Pepsi-Cola and Seven-up have launched recycled content PET bottles (containing 25% recovered resins) for a selection of their soft drinks.

In June 1992, Kraft General Foods Canada introduced this country's first plastic food containers made from tertiaryrecycled resins. Kraft's 455 mL barbecue sauce bottle contains 25% recycled PET. Eastman Chemical supplies the resin, produced by the methanolysis recycling process at its Rochester, New York facility. Even though the cost of the recycled resin is about 10% higher than virgin feedstocks, Kraft believes that as the markets for PCR grow the price will become competitive.

A MINI-GLOSSARY OF TERTIARY RECYCLING

Glycolysis
Clean and colour-sorted plastic scrap is partially depolymerized by heating with ethylene glycol. Cheaper that methanolysis, although the recovered monomers are more difficult to purify.

Hydrolysis
Acids, caustic soda, ammonium hydroxide and water are employed to completely break down clean, sorted plastic. A moderately priced treatment process, although purification of the monomer is a problem.

Methanolysis
Heated methanol vapour completely depolymerizes plastic scrap. A mix containing different colours and qualities of scrap can be treated.

Pyrolysis
Mixed and contaminated plastics are decomposed back into oil and/or gases using heat (sometimes in the form of a molten salt or metal bath) in an oxygen-starved reaction chamber. Small amounts of solid char may also be produced.

Refinery Recycling
Plastics are introduced into a refinery unit and the polymer chains broken into lighter fractions identical to those split from crude oil stocks.

THE DISPOSAL OF MUNICIPAL SOLID WASTES

The majority of the plastics found in the municipal solid waste stream (from both residential and IC&I sources) are disposed of in municipal or private landfills in Ontario. (In 1991, there were 1,358 solid waste landfills operating under valid Certificates of Approval issued by the Ontario Ministry of the Environment and Energy.)

A small amount of plastic may be burned in one of five municipal solid waste incinerators that are currently permitted and operated in Ontario. Incineration reduces waste volumes 80-90%; bottom ash and slag may be disposed of in a sanitary municipal landfill, while fly ash must be taken to a secure landfill.

Approximately 1.3 million tonnes of Ontario's municipal solid wastes were exported to the United States for incineration or landfilling in 1992. Some of the recyclable materials were removed from those wastes prior to export and, consequently, it is not possible to calculate the amount of plastic that was shipped out of the province.

Traditionally, municipalities have been responsible for providing garbage pickup, transfer and disposal services for residential wastes. The cost of these services is usually recovered from general municipal revenues. Recent amendments proposed for provincial legislation would make it possible for municipalities to charge user fees (a per-bag fee, for instance) for residential waste disposal services.

A mix of public and private sector haulers are used to collect and deliver residential and certain commercial wastes to transfer stations, recycling facilities or disposal facilities. Several different types of trucks — including front, side or rear-loaders, roll-offs, push-out transfer trailers, and compartmentalized top or side-loading trucks — are employed, depending on the nature of the wastes and a municipality's 3Rs/disposal intentions.

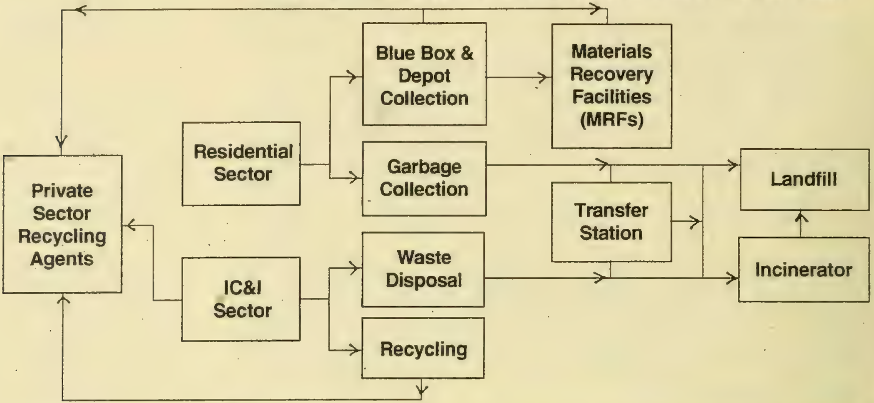
While some municipalities provide collection services to IC&I generators, most are required to hire private haulers to transport their wastes and recyclables.

Solid wastes from IC&I generators, demolition and construction wastes, and residential wastes from other communities may be accepted for disposal at a municipal landfill upon payment of a tipping fee (charged according per tonne of waste or vehicle size or type of waste material or source of the waste). Very few municipalities do not charge tipping fees for non-residential wastes, although most do. Fees can range from $25.00 per tonne to a mid-range of $70.00 a tonne to a high of $150.00 a tonne. Several municipalities have recently lowered their tipping fees in an attempt to attract back those waste shipments that may be going to U.S. disposal facilities or other destinations.

The Association of Municipal Recycling Coordinators (AMRC) helps more than 100 municipal members, as well as some corporate sponsors, deliver cost-effective and efficient 3Rs programs through research reports, documents and expert consultation.

The Recycling Council of Ontario (RCO) is a multi-stakeholder, non-profit group that supplies 3Rs information to businesses, municipalities, institutions and the general public. The RCO produces fact sheets, directories and how-to guides, and operates a toll-free hotline.

ONTARIO'S WASTE MANAGEMENT SYSTEM

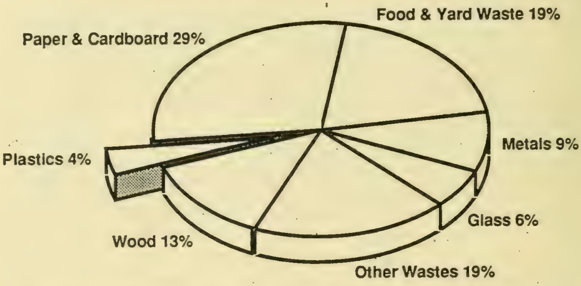


12 members of the Plastic Film Manufacturers Association of Canada have launched a curbside collection program in four Ontario communities: Hamilton/Wentworth, Mississauga, Peterborough and Quinte Region. The program is aimed at testing recycling technologies and developing markets for PCR film. After sorting and baling, the collected film is recycled for use in garbage bags, trash can liners and general purpose bags and films. A demonstration program in Peterborough showed that plastic film collection is both feasible and inexpensive. Participation rates are high and incremental costs could run as little as 57 cents per household per year.

Table F.8

WHAT'S GOING INTO ONTARIO'S LANDFILLS?

(both IC&I and residential wastes, by weight)



(Based on Physical and Economic Dimensions of Waste Management, 1991,CH2M Hill.)

Studies that analyze waste totals by volume commonly find that plastics represent from 13-15% of the municipal solid waste stream. In 1989, residential sources were responsible for about 60% of the plastics going to disposal facilities, with IC&I generators accounting for the remainder.

MUNICIPAL 3Rs INITIATIVES

Many municipal 3Rs initiatives -- and blue box-based recycling programs in particular -- are concerned, primarily, with residential wastes collected from individual households and apartments. While some institutional, commercial and industrial wastes are collected, much of the plastic in the IC&I waste stream (both pre and post-consumer) is handled by private contractors.

The remainder of Appendix F covers several of the municipal programs that are successfully diverting plastics from disposal. During the implementation of such programs, some good data have been gathered on the amounts and types of plastics being collected from residential sources. Equivalent data on IC&I plastic recycling efforts are not yet available.

The increased cost of waste disposal services, the shrinking capacity of municipal landfills, and the difficulty in siting new facilities, as well as general environmental concerns, has focused municipal attention on 3Rs and other waste diversion opportunities. In addition, new provincial 3Rs regulations will formalize minimum municipal source separation and recycling requirements.

Certain municipalities have banned corrugated cardboard, fine paper, drywall, tires and other classes of solid waste for disposal in their landfills. They have implemented curbside or depot-style recycling programs, distributing blue box collection containers and operating specialized collection vehicles. They have established and operate (with or without private sector partners) material recycling facilities (MRFs), reuse centres and repair facilities. Some communities even sponsor "exchange days" when residents are invited to place unwanted, but usable, goods at curbside. Anybody is free to scour the streets for stuff they can use. Reuse facilities are popping up all over Ontario.

However, experience with various blue box programs has shown that there is no single method or technology to reduce residential solid waste. For instance, reduction initiatives require changes in the way we do things. Reuse and recycling initiatives require support for the collection, storage and processing infrastructure, and expanded market for recyclable materials. In addition, products need to be designed with their future reuse/recycling in mind.

Successful programs take a number of conventional waste reduction activities, push them to their logical conclusion, and rework them into a comprehensive system. The key to success is the careful cultivation of participation of all stakeholders, including brand owners and manufacturers, retailers, the recycling industry and, of course, the general public.

Promotional efforts can involve a mix of approaches and educational vehicles, including: press releases, newspaper articles, advertisements and television shows; waste reduction guides (tailored to different sectors such as schools, offices, households, etc.); programs for local primary and secondary schools; a directory of local reuse, repair and recycling centres; a telephone hotline to handle questions; and a reuse/recycling information centre.

Mississauga Plastics Demonstration Project

In May, 1993, 140,000 households were sent a revised list of the plastic materials that would be picked up in curbside blue boxes: PET bottles, HDPE containers, foam and rigid PS containers, LDPE/LLDPE plastic bags and film, dairy tubs and juice boxes. Every effort was made to find markets for the high-grade plastics collected, and a consultant was hired to audit the incremental costs. In the first month, 89 tonnes of plastics were collected and sorted.

THE COLLECTION AND PROCESSING OF RECYCLABLES

Twenty years ago, most recycling was carried out by entrepreneurs (who were attracted by the value of newsprint or tin cans on the secondary materials market) or non-profit groups with environmental, job creation or fund raising motives. Today, they have been joined by many new players, including municipalities, industry associations like OMMRI, the Ministry of Environment and Energy and other government agencies, and a vigorous environmental protection industry.

The first small MRFs were set up in the late 1970s. By early 1993, there were 46 MRFs operating in Ontario, half of them owned by the private sector and half by municipalities (most of which were operated by a private sector partner). The great majority of MRFs are located in Southern Ontario communities, and process the core materials — old newsprint, glass jar and bottles, food and drink cans and certain other recyclables — collected in curbside "blue boxes."

Some MRFs rely on preliminary sorting and/or processing of segregated recyclables (which may be done by the generator or at curbside). Others handle fully commingled feedstock that must be separated using a combination of mechanical and manual systems. Standard MRF equipment may include: rolling caddys, bins and cages; lift trucks and transfer equipment; balers, densifiers, crushers and/or chippers; conveyors, sorting lines, and automatic sorting systems such as screens, air classifiers and magnetic separation equipment.

The expansion of the blue box program, supported by OMMRI, MOEE and the participating municipalities, has kept pace with the growth in MRF capacity. From its beginnings in the early 1980s — a 30,000 test program in Kitchener — the number of Ontario households equipped with blue boxes passed the one million mark in 1988 and the two million level in 1990. By 1992, there were more than three million homes using the blue box to deliver selected recyclables to local MRFs.

The program is destined to continue to grow. According to new provincial 3Rs regulations, all municipalities with more than 5,000 residents must offer either blue box or (under certain conditions) depot-style recycling programs that collect newsprint, and food and beverage containers made of aluminum, glass, steel and PET. In addition, municipalities must include at least two materials selected from a supplementary list of recyclables that includes aluminum foil, boxboard, corrugated cardboard, fine paper, foam plastics, magazines, plastic film, rigid plastic containers, telephone directories or textiles.

A number of municipalities already accept and recycle certain plastic materials. Table F.9 lists the number of participating municipalities and the plastics they handle.

The Municipal Recycling Collection Cost Model is a step-by-step computer program designed to help municipalities launch new curbside recycling programs or expand existing systems to handle additional materials. Co-sponsored by MOEE and EPIC, the "how-to" model allows users to gauge program variables, such collection frequency and techniques, equipment and staff requirements, and material recovery rates. AMRC and member municipalities are working with the model to lower costs and improve the efficiency of collection.

Table F.9
MUNICIPAL BLUE BOX PLASTIC COLLECTION

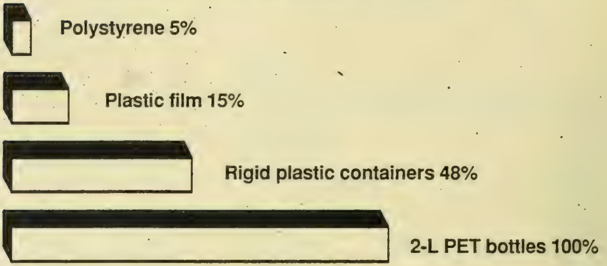
2L PET	Rigid Bottles	Rigid Tubs	Film	PS	Community	Households
■	■				Metro Toronto	686,332
■	■		■		Hamilton-Wentworth	157,800
■	■	■	■	■	Mississauga	142,500
■					Niagara Region	140,717*
■					Durham Region	129,100
■					Waterloo Region	117,940
■					Essex-Windsor	117,170
■	■			■	Halton Region	109,181
■					London	72,700
■					Brampton	72,500
■					Sudbury	52,000
■	■	■	■		Markham	49,080
■					Kingston et al	46,000
■	■				Sarnia	42,000
■	■	■	■	■	Quinte	38,800
■	■	■			Bluewater (Grand Bend)	37,845
■	■				Haldimand-Norfolk	36,000
■	■				Guelph	31,500
■					Peterborough County (excluding city)	28,550
■					Richmond Hill	27,500
■					Sault St. Marie	27,000
■					N.O.R.A. (Dryden)	26,950
■	■	■	■		Muskoka et al	26,600
■	■				Brantford	25,000
■			■		Peterborough (city)	23,900
■					Barrie	23,799
■					North Simcoe (Midland)	22,865
■					Parry Sound	22,650
■					Ottawa (apartments only)	22,000
■					Northumberland County	19,460
■					Wellington County	19,100
■					North Bay	17,700
■					Lanark County	17,600
■	■	■			Cornwall	16,300
■	■				Port Elgin	15,600
■					S. Simcoe	15,390
■					Newmarket	15,200
■					Georgina	13,400
■					Kanata	11,896
■	■	■	■	■	Prince Edward County	11,020
■	■	■	■		St. Thomas	11,000
■					Caledon	10,810
■				■	Orillia	10,140
■	■				Alexandria	10,000
■					Brockville	7,750
■					Stratford	7,750
■					Almaguin Recycling Initiative	7,700
■	■		■		Lindsay	6,950
■					London Township et al	4,762
■	■				Wallaceburg	4,429
■	■		■		Yarmouth	2,600
■	■				North Dorchester	2,560
■	■		■		Armour	1,400
■	■				Wallace	650
■	■				Belmont	400
■					Small communities	274,790

*(*Rigid bottles collected from only 3,000 households.)*

Total # of House-holds	Recyclable Plastics Collected
2,870,336	2L PET
1,468,547	Rigid bottles
333,145	Rigid tubs
471,650	Plastic film
311,641	Polystyrene

Table F.10

WHICH RESINS ARE BEING COLLECTED?



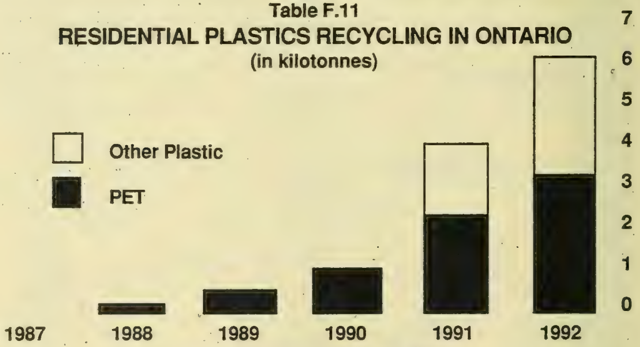
(Based on data supplied by OMMRI, 1993.)

More than three million households in Canada now use Blue Boxes to recycle their old newsprint, bottles, cans, PET soft drink bottles. An increasing number of communities are also collecting additional recyclable resins, including rigid plastic bottles, bags and film, and polystyrene. As of February, 1993, 100% of the homes equipped with Blue Boxes could recycle their 2-litre PET bottles, 48% their rigid plastic containers, 15% their plastic film and 5% their polystyrene.

Table F.11

RESIDENTIAL PLASTICS RECYCLING IN ONTARIO

(in kilotonnes)



(Data supplied by OMMRI, March 1993.)

The marketing of PCR and other materials may be done by either the municipality or the MRF contractor. Over the years, the specifications for recyclable materials separated from the waste stream by MRFs have become more stringent. The tolerance level for contaminate content or the mix of colour/resin type has dropped significantly. In the future, MRFs may have to perform more value-added operations, such as washing and grinding, in addition to installing more sensitive and efficient sorting systems.

EXPANDING THE BLUE BOX PROGRAM

In 1991, Quinte Regional Recycling launched its Blue Box 2000 program to show how traditional municipal recycling efforts can be expanded to their maximum potential. An expanded list of eligible Blue Box 2000 materials includes PET bottles, rigid plastic bottles and tubs, film plastic, and foam plastic and rigid trays, as well as a number of metal, glass, textile and paper products. Almost 40,000 recycling boxes have been distributed to households in 15 municipalities, with about 1,000 IC&I establishments also taking part. The first year of the program has been declared a success. Diversion tonnage has gone up dramatically, while costs have come down.

In addition, organizers have concentrated on finding viable markets for recycled materials. Whenever possible, post-consumer plastics have been sorted according to resin type and directed to the highest value end market available; "plastic wood" processing was not considered a suitable market for clean, sorted plastics. In the plastics area, wide-mouth contains, tubs and lids, made from a wide variety of difficult-to-identify resins, continue to be the most difficult marketing challenge. However, market development opportunities improve with the involvement of brand owners, recyclers and the plastics industry.

An ad hoc committee formed by EPIC is coming up with markets to recycle the "wide-mouth" containers collected in municipal blue box programs. The tubs and lids are made, primarily, from LDPE, HDPE, PP and a number of other resin types. Sorting is a difficult, time-consuming process. Testing of automatic and manual sorting methods is underway. The committee is also examining potential uses for commingled tubs, such as compression molding into pallets or blending with virgin resins and using injection molding to make crates and boxes.

New sorting technologies are being developed

One of the main factors restricting recycling programs is the difficulty in separating the plastics recovered from the waste stream into their individual polymer types. Most sorting today is done manually and this process is tedious, subjective and slow. However, automatic and continuous separation technologies are being developed or refined to minimize the handling of waste and achieve a more efficient reclamation process.

Most automatic separation methods rely on the physical and/or optical properties of the polymers handled. For example, the difference in specific gravities between PET and HDPE facilitates their separation through a simple "float sink method" (this technique is less effective when materials have similar specific gravities).

New systems are being developed to sort flake derived from chopped plastic bottles. Optical methods has been useful in separating chips of green

Examples of post-residential plastics currently being recycled:

* rigid plastic containers manually sorted and baled according to PET, PVC and HDPE resin type
* 2-litre PET soft drink bottles
* rigid and foam polystyrene
* LDPE/LLDPE film plastic bags, milk pouches and outer wrappings

Examples of products that are not currently being recycled:

* microwaveable PET containers
* HDPE bottles that contained pesticides, flammable liquids, etc.
* the pump mechanism from containers
* flexible wrap from meat, cheese or most other food products
* multi-layered and mixed resin types
* automotive parts, toys, swimming pool liners, garden hoses and most other consumer products
* disposable diapers

PET plastic from clear PET, and electrostatic techniques have been employed for separating PET and PVC resins with excellent results. These techniques are most successful in purifying resin streams which contain only one contaminant.

Solvent separation has also been used to separate classes of resins. Hot solvents selectively dissolve specific polymers which, in turn, can be recovered from the solvent. While this technique is currently limited in its application, work continues to make it more economic and efficient.

Improved resin detection systems are also increasing the efficiency of automatic separation systems. For example, X-ray systems are capable of detecting the presence of PVC containers in a stream of PET bottles. Infrared techniques have been used to separate PET, HDPE and polypropylene. And optical scanners are able to distinguish different coloured plastics.

It is possible to identify the different resin types when containers are presented to the sensing heads one at a time. However, difficulties arise when they pass in a jumbled, rapidly moving stream consisting of crushed bottles of all sizes and shapes. Research is continuing in this field and the problems will be overcome eventually.

MARKETS FOR RECYCLED RESINS

The end use or market for recycled resins is the economic engine that drives the recycling process. The reclamation process for post-industrial scrap may involve little more than grinding the scrap to obtain a clean resin that can be mixed with virgin stocks and reused. The market is close, captive and immediate.

Processing post-consumer plastics, collected in residential Blue Boxes as well as schools, offices and institutions, is a more complex process. The collected plastics are seldom as clean as virgin resins and may contain unknown residual contaminants. This may restrict the markets for some reclaimed resins which do not meet standards for food packaging or other specific uses.

However, the markets for post-consumer resins continue to grow. To date, the increased market activity has focused primarily on four resins: PET, high density polyethylene, LDPE/LLDPE, and polystyrene. In response, the recycling infrastructure is providing an increasingly larger and more reliable stream of recycled PET, HDPE and PS to attract large scale manufacturers.

At the same time, the plastics processors, fabricators, government agencies and some municipalities are working to expand the end-use markets for additional resin types.

FEDERAL AND PROVINCIAL PROGRAMS

THE NATIONAL PACKAGING PROTOCOL

The federal and provincial governments, working through the Canadian Council of Ministers of the Environment (CCME), have developed a national strategy for the environmentally sound management of packaging. The objective is to significantly reduce the amount of IC&I and residential packaging waste that is currently going to disposal.

On March 20, 1990, the CCME endorsed the National Packaging Protocol, commonly known as NAPP, a policy framework which incorporates a series of waste diversion targets. The amount of packaging sent for disposal must be cut by 20% by the end of 1992, 35% by the end of 1996, and 50% by December 31, 2000. The reduction targets are based on weight and use 1988 as a base.

At least half of the diversions must be achieved through source reduction and reuse initiatives. Recycling programs are to make up the remainder of the cuts. NAPP embodies six fundamental policies that will guide implementation:

1. All packaging shall have minimal effects on the environment.
2. Priority will be given to the management of packaging through source reduction, reuse and recycling.
3. A continuing campaign of information and education will be undertaken to make all Canadians aware of the function and environmental impacts of packaging.
4. These policies will apply to all packaging used in Canada, including imports.
5. Regulations will be implemented as necessary to achieve compliance with these policies.
6. All government policies and practices affecting packaging will be consistent with these national policies.

A Code of Preferred Canadian Packaging Practices has been released to guide the selection and design of packaging. The code is based on the waste management hierarchy of (1) no packaging, (2) minimal packaging, (3) reusable packaging, and (4) recyclable packaging and packaging containing recyclable materials.

The Ontario Environmental Protection Act (EPA) provides the legal basis for Provincial programs to protect Ontario's land, air and waters. The EPA establishes the regulatory powers of the Ministry of the Environment and Energy, including pollution-related penalties and enforcement. Regulations to manage solid wastes are promulgated under the Act.

Ontario Regulation 347 is the primary control instrument for waste management in the province. O.Reg. 347 provides definitions for solid and hazardous wastes, detailed standards for waste disposal facilities, and rules for the handling, transport and disposal of hazardous wastes.

ONTARIO'S 3Rs REGULATIONS

On April 29, 1993, the Ontario Ministry of Environment and Energy announced its intent to implement a set of five new waste reduction regulations. The regulations are designed to divert an estimated two million tonnes of waste from Ontario's landfills each year and help realize the province's minimum target of 50 percent waste diversion by the year 2000.

Designated large IC&I waste generators — including manufacturers, retailers, schools, hospitals, construction and demolition firms, offices, restaurants and hotels — will have to conduct annual waste audits and waste reduction workplans, as well as set up source separation and recycling programs for designated categories of solid wastes.

The audits are designed to measure the amounts, nature and composition of wastes generated, how they are produced (including management policies that affect their production), and the ways they are managed. The workplans must describe specific 3R activities, who is responsible for each part of the plan, the scheduled timelines, and the expected results.

Major packaging users — in the food, beverage, paper and chemical product sectors — and large importers of those products will also be required to undertake packaging audits and packaging reduction workplans.

Manufacturers that employ more than 100 employees (either full-time and/or equivalent part-time) must source separate their corrugated cardboard, fine paper, newsprint, wood, steel, aluminum, glass and plastic wastes. The regulation mandates the separation of the following plastic materials: HDPE jugs, pails, crates, totes and drums; LDPE film; EPS foam; and PS trays, reels and spools.

All municipalities with a population of 5,000 or more must operate residential "blue box" recycling programs. Either curbside or depot-style recycling systems will be permitted, as long as they collect and handle newsprint, food and beverage containers (made of aluminum, glass, steel and PET plastic), as well as at least two more materials selected from a "supplementary list" of solid wastes. These may include foam plastics, plastic film, or rigid plastic containers, among a number of other materials.

Finally, recycling facilities may be eligible for an exemption from the approval procedures currently mandated under the Environmental Protection Act, provided that certain minimum standards and public/MOEE notification requirements are met.

The audit and workplan provisions take effect within six months of promulgation, the source separation and recycling requirements in twelve months, and the municipal requirements by July 1, 1994 (except for Northern Ontario municipalities which are given up to 36 months to comply).

Incineration

In September 1992, an amendment to O.Reg. 347 banned all future municipal solid waste incinerators in Ontario. Currently approved and operating MSW incinerators may continue to operate. In addition, the incineration of liquid industrial and hazardous wastes (including waste-derived fuel), biomedical waste, untreated wood, sewage sludge, pulp & paper mill sludges, and paper deinking sludge is permitted under stringent conditions.

Bill 143

was designed to address the management of solid wastes in the Greater Toronto Area and amend the Environmental Protection Act. It passed into law on April 23, 1992. Provisions of the Bill will allow Ontario to implement a broader range of 3Rs regulatory measures.